Medicines-related hospital admissions and medication reviews: patients' and pharmacists' perspectives

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Medicines-related hospital admissions and medication reviews: patients' and pharmacists' perspectives

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Declaration of any previous submission of the work

The material presented here for examination for the award of a higher degree by research has not been incorporated into a submission for another degree.

Candidate's signature

Declaration of authorship

I am the author of this thesis, and the work described therein was carried out by myself personally.

Candidate's signature

‘Tell me, and I will forget.

Show me, and I may remember.

Involve me, and I will understand.’

Confucius, circa 450BC

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Abstract

Medicines-related hospital admissions are responsible for 3.7% - 7.7% of all hospital admissions. Discharge from hospital is a particularly challenging time regarding medicines management. When patients transfer from one setting to another, 52.7% experience at least one medicine-related problem. Post-discharge medication review by community pharmacists has been postulated as a way of minimising medicines-related problems after hospital discharge with the aim of reducing medicines-related hospital-readmissions.

The aims of this study were to explore the knowledge and attitudes of patients and community pharmacists around post-discharge medicines support and to determine how pharmacists could help patients manage their medicines better once discharged from hospital.

A preliminary phase of the study used Hospital Episode Statistics data to establish the trends in medicines-related hospital admissions from 2008 to 2015. Following this a mixed-methods sequential exploratory design was used. Qualitative data were generated from interviews with seven patients who had a medicines-related hospital admission and five community pharmacists providing the MUR service. Quantitative data were produced from a survey of 495 community pharmacists in England.

The study found that community pharmacists have the expertise, are willing and well positioned to support patients managing their medicines after a hospital discharge. Barriers persist around their ability to build key relationships, effective methods of communication and integration into the primary healthcare team. Further work is required to ensure that patients and healthcare professionals are aware of community pharmacists' expertise and how embedding their role, and that of GP practice pharmacists, in discharge pathways would benefit patient care.

In conclusion, new ways of working and enhanced use of IT are required to facilitate and optimise patient care during transitions from hospital to primary care. Community pharmacists are well placed to support patients after hospital discharge but should be better integrated into the primary-care team.

Abbreviations

For abbreviations in bold type, definitions are included in the Glossary.

ADE	Adverse drug event
ADLs	Activities of daily living
ADR	Adverse drug reaction
AiMP	Association of Independent Multiple Pharmacies
AKI	Acute kidney injury
BMA	British Medical Association
Bp	Blood pressure
BPharm	Bachelor of Pharmacy degree, awarded in the UK until 1999
CCG	Clinical Commissioning Group – the name for Primary care organisations from April 2013
C-HLOC	Chance health locus of control
CI	Confidence interval
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CNS	Central Nervous System
COPD	Chronic Obstructive Pulmonary Disease
CPO	Chief Pharmaceutical Officer
DDI	Drug-drug interaction
D-HLOC	Doctor health locus of control
DMR	Discharge medicines review
ED	Emergency Department
E-HLOC	External health locus of control
FAE	Finished Admission Episode – term used in HES data
FCE	Finished Consultant Episode – term used in HES data
FD-MUR	First-dispensing medicines use review
G-HLOC	God health locus of control
GPhC	General Pharmaceutical Council, regulatory body for pharmacy professionals and premises, formed in September 2010
HbA1c	Glycated haemoglobin
HES	Hospital Episode Statistics
HCP	Health care professional
HLOC	Health locus of control
HMR	Home Medicines Review
HR	Hazard Ratio
HRA	Heath Research Authority
HSCIC	Health and Social Care Information Centre, since July 2016 known as NHS Digital
ICD-10	International Classification of Diseases, 10th Edition
IBM SPSS Statistics	IBM Statistics Package for the Social Sciences

I-HLOC	Internal health locus of control
IMM	Integrated Medicines Management
IPA	Interpretative Phenomenological Analysis
IT	Information technology
LMQ-3	Living with Medicines Questionnaire, version 3
LPC	Local Pharmaceutical Committee
LPF	Local Practice Forum
MDT	Multi-disciplinary team
MHRA	Medicines and Healthcare Products Regulatory Agency
MPharm	Master of Pharmacy degree, awarded in the UK from 2001
MUR	Medicines use review
NHS	National Health Service
NMS	New Medicine Service
NNT	Number Needed to Treat
NPA	The National Pharmacy Association
NRES	National Research Ethics Service
ONS	Office for National Statistics
OR	Odds Ratio
PCT	Primary Care Trust - the name for Primary Care organisations from 2001 until April 2013
PDA	Pharmacists' Defence Association
PD-MUR	Post-discharge medicines use review
PhIF	Pharmacy Integration Fund
PO-HLOC	Powerful others health locus of control
PI	Principal investigator
PIL	Patient Information Leaflet
PMR	Patient medication record
PSNC	Pharmaceutical Services Negotiating Committee
QOF	Quality and Outcomes Framework
QoL	Quality of life
RCGP	Royal College of General Practitioners
RCT	Randomised Controlled Trial
RPS	Royal Pharmaceutical Society, pharmacists' representative body formed in September 2010
RPSGB	Royal Pharmaceutical Society of Great Britain, regulatory and representative body for pharmacists until September 2010
RR	Relative Risk
SCR	Summary Care Record
SmPC	Summary of Product Characteristics (also referred to as a SPC in some sources)

Glossary

Acute kidney injury (AKI)	Sudden damage to the kidneys meaning they do not work properly. After treatment, kidney function usually improves.
Clinical medication review	A review with consideration of the patient's medication with regard to their conditions and symptoms with access to the medical notes, laboratory tests and the patient (Blenkinsopp, Bond and Raynor, 2012).
Compliance aid	Reusable tray or disposable blister pack into which daily, weekly or monthly doses of medication are dispensed.
Compliance and concordance review	A review to find out about the patient's beliefs about medicines and how they are taking them, conducted with the patient (Blenkinsopp, Bond and Raynor, 2012). May also be called an adherence review.
Discharge medicines review (DMR)	Service provided to patients by community pharmacists in Wales consisting of two parts: part one is identification of patients and medicines reconciliation, part two is supporting patients to adhere to their medication (Hodson *et al.*, 2018).
Elective admission	Planned admission to hospital
Finished admission episode (FAE)	'The first period of inpatient care under one consultant within one health care provider' (UK Parliament, 2009).
Finished consultant episode (FCE)	'A continuous period of care (episode) administered within a particular consultant specialty at a single hospital provider. If a patient is transferred to another consultant or to a different provider during a spell of treatment (the total time a patient is in hospital, from admission to discharge) a new record is generated' (HSCIC, 2013b).
Glycated haemoglobin (HbA1c)	A blood test to measure the amount of glucose bound to haemoglobin. It reflects the average level of glucose in the blood over the past 2-3 months (Lab Tests Online UK, 2018).
Hyperkalaemia	Raised potassium level in the blood.
Integrated Medicines Management (IMM)	The services vary by location but generally include, medicines reconciliation, intensive pharmaceutical care for the patient whilst in hospital, communication and follow-up of patients after discharge.
Living with Medicines Questionnaire, version 3 (LMQ-3)	Validated patient questionnaire that measures the burden of using prescribed medicines (Katusiime, Corlett and Krska, 2018).
Medicines reconciliation	'Medication reconciliation is the process of creating the most accurate list possible of all medications a patient is taking — including drug name, dosage, frequency, and route — and comparing that list against the admission, transfer, and/or discharge list, with the goal of providing correct medications to the patient at all transition points' (Institute for Healthcare Improvement, 2018).
NVivo	Software produced by QSR International, used for qualitative data analysis.
Off-label	A medicine with an existing UK marketing authorisation that is used outside the terms of its marketing authorisation, for example by indication, dose, route or patient population and it is not expected that the existing UK marketing authorisation will be extended to cover this use in the next two years (NICE, 2017).
Prescription review	A practical medicines-management review to improve the safety, clinical and cost-effectiveness of the prescription, conducted without the patient (Blenkinsopp, Bond and Raynor, 2012).

Quality and Outcomes Framework (QOF)	'A voluntary reward and incentive programme. It rewards GP practices, in England for the quality of care they provide to their patients and helps standardise improvements in the delivery of primary care' (NHS Digital, 2018d).
Summary Care Record (SCR)	'An electronic record of important patient information created from GP medical records. It can be seen and used by authorised staff in other areas of the health and care system involved in the patient's direct care' (NHS Digital, 2018e).
Unlicensed	A medicine that does not have a UK marketing authorisation and is not expected to do so in the next two years (NICE, 2017).
Yellow Card	The Yellow Card Scheme allows healthcare professionals and the public to report side effects, defective and counterfeit medicines (amongst other things) to the medicines and healthcare products regulatory agency (MHRA) so they can monitor the safety of medicines in the UK (MHRA, 2015).

1 Introduction

Chapter Overview

This introductory chapter outlines the research area and provides a brief rationale for the research that has been conducted. It starts by providing a short synopsis of medicines-related hospital admissions, and introduces how medication reviews by community pharmacists in England could have an impact on this issue. The aims, objectives and research questions are then stated, followed by an overview of the thesis chapters.

1.1 General overview

Systematic reviews have estimated that medicines-related problems account for between 3.7% and 7.7% of all hospital admissions in England (Wiffen *et al.*, 2002; Howard *et al.*, 2007) and the problem is increasing over time (Wu *et al.*, 2010). Some of these medicines-related admissions would have been unforeseen and therefore unavoidable, but a significant proportion could have been predicted and therefore potentially prevented (Howard, Avery and Bissell, 2008). Based on a study in England that involved over 18,000 patients (Pirmohamed *et al.*, 2004), it has been estimated that preventable adverse drug reaction (ADR)-related hospital admissions cost the National Health Service (NHS) £530 million in 2015 (NICE, 2015b).

It is well known that when patients are transferred from one setting to another medication problems can occur (Garcia-Caballos *et al.*, 2010) and this is particularly true when patients are discharged from hospital. A systematic review exploring medicines-related problems in older people after hospital discharge found that 52.7% of patients suffered at least one medicines-related problem at this time (Garcia-Caballos *et al.*, 2010). These medication problems at care transitions can result in the patient being readmitted to hospital (Coleman, Smith, Raha and Min, 2005).

In England, hospital readmissions are increasing year-on-year; it has recently been found that between 2010/11 and 2016/17, emergency readmissions to hospitals in England increased from 1.1 million to over 1.3 million, an increase of 19.2% (Quality Watch, 2018). A proportion of these emergency readmissions would have been secondary to medication-related problems

(Ruiz *et al.*, 2008). A prospective observational study has estimated that the cost to the NHS of post-discharge medication-related harm in older adults is £396 million each year (Parekh *et al.*, 2018).

Reducing the burden of medicines-related problems is therefore a priority for the NHS. Medication review is one tool that could potentially be used to mitigate the problem. Community pharmacists in England provide the medicines use review (MUR) service as part of their contract with the NHS. This service involves the pharmacist having a consultation with the patient with the aim of enabling patients to optimise the use of the medicines they have been prescribed. Patients who have recently been discharged from hospital with changes to their regular medicines are one group that community pharmacists target when considering the patients who will benefit most from a MUR. Ensuring that these post-discharge MURs (PD-MURs) occur in a timely manner for eligible patients could be one way of helping to reduce preventable medicines-related readmissions to hospital.

Many of the studies of medicines-related problems and their impact on hospital admissions are quantitative rather than qualitative (Pirmohamed *et al.*, 2004; Leendertse *et al.*, 2008; Pedros *et al.*, 2014). In particular, there is a paucity of evidence around what it is like to be a patient who experiences a medicines-related hospital admission and whether initiatives such as MURs or GP medication reviews assist the patient in managing their medicines - thus potentially avoiding complications such as hospital admissions and readmissions. A relatively recent PhD project in England investigated patients' views of MURs, but this was focussed on the MUR consultation rather than medication reviews in general or the effect of these consultations on hospital admissions or readmissions (Latif, Boardman and Pollock, 2013).

1.2 Defining the research problem

MURs were introduced into the community pharmacy contract in 2005 with the aim of improving patients' knowledge and use of their medicines. Since 2011, when target groups were introduced, a specified proportion of MURs should be completed for patients who would gain most benefit from them. Patients who have recently been discharged from hospital are part of this target group and are eligible for a PD-MUR (NHS Employers and PSNC, 2013a). The experiences and attitudes of community pharmacists and patients to PD-MURs are an important factor in the success, or otherwise, of this initiative.

1.3 Research Questions

1. Are medicines-related admissions to hospital a problem in England and what medicines are implicated?
2. What are the experiences of patients who have had a medicines-related admission to hospital?
3. What are the experiences and attitudes of patients towards PD-MURs and medication reviews in general?
4. What are the attitudes of community pharmacists conducting PD-MURs and do these attitudes have any effect on the engagement of community pharmacists with PD-MURs?

1.4 Aims and Objectives

1.4.1 Aims

The aims of the study are:

1. To explore the knowledge and attitudes of patients and community pharmacists around post-discharge medicines support particularly PD-MURs.
2. To determine how pharmacists can more effectively use their clinical skills, and tools such as PD-MURs, to help patients manage their medicines better once discharged from hospital, with a view to reducing medicines-related hospital admissions.

1.4.2 Objectives

The objectives of the study are to:

1. Establish how many medicines-related admissions to hospital occur in England using hospital episode statistics (HES) data.
2. Recruit patients who have a medicines-related hospital admission for interview about their experience.
3. Refer the recruited patients to their community pharmacist for a PD-MUR.
4. Follow up referred patients and discover their experience of a PD-MUR and medication reviews in general.
5. Explore the experiences and attitudes of community pharmacists conducting PD-MURs.

1.5 Research approaches and methods

The study used a mixed-methods, sequential exploratory approach, incorporating a variety of strategies to explore patients' and community pharmacists' views and experiences (Creswell and Plano Clark, 2011. p.69). Preceding the sequential exploratory stage, the study used descriptive statistics to analyse and summarise routinely collected HES data to determine the trends over time in medicines-related admissions to hospitals in England. The sequential exploratory approach then commenced with the qualitative patient study which explored the 'lived experience' of a patient's medicines-related admission to hospital through semi-structured interviews analysed using interpretative phenomenological analysis (IPA). This was accompanied by the qualitative community pharmacist study, which investigated the experiences of community pharmacists providing the MUR service through semi-structured interviews which were analysed thematically. The final quantitative phase was an electronic survey, enquiring about community pharmacists' beliefs and experiences around MURs and their provision.

The use of these research techniques in a sequential manner allowed each stage to build on the findings of the previous one and guide the course of the research.

1.6 Research originality

This research has added to the current evidence base as it used IPA to investigate the patient experience of a medicines-related admission to hospital and community-based medication review in this cohort of patients. The survey of community pharmacists is believed to be the first to use factor analysis as the analytical technique to determine what influences them when they make decisions about various aspects of MURs and PD-MURs.

1.7 Thesis overview

Following on from Chapter 1 is the background chapter. This provides a summary of the policy context of MURs provided by community pharmacists in England and summarises the rationale for the service, how it has developed over time and statistics to show the current uptake of the service by patients attending community pharmacies.

Next, is the literature review, Chapter 3, which presents the published evidence around the causes of hospital admissions and readmissions and whether medication reviews have any effect on reducing medicines-related hospital admissions.

The methodology chapter, Chapter 4, summarises the rationale for the research approach that was employed when conducting the study. The methods for each phase of the research are presented sequentially in the subsequent chapters, which follow the same format of methods, results and a brief discussion of each part of the research.

Chapter 5 presents the methods and findings of a preliminary piece of fieldwork using HES; an investigation into the scale of the problem of medicines-related admissions to hospital and how the trends have changed over time.

In Chapter 6, a description of the methods utilised in the in-depth examination of patients' experiences of a medicines-related admission to hospital and medication reviews are stated. Patients participated in in-depth interviews which were analysed using the qualitative analytical technique IPA, and the findings and discussion are presented in this chapter.

Chapter 7 begins with an outline of the methods used for interviewing community pharmacists. It then goes on to present the findings of the community pharmacist interviews where they gave their accounts of their experiences and attitudes of the MUR service. These interviews were analysed using the qualitative technique, thematic analysis. The results of both the patient and community pharmacist interviews were used to guide the development of a questionnaire for community pharmacists and this chapter concludes by demonstrating how the final questionnaire was formulated.

The methods, results and discussion of the survey of community pharmacists' attitudes and experiences of MURs are presented in Chapter 8. The responses to the questionnaire provided quantitative data that were analysed using descriptive and inferential statistical techniques.

A discussion of the results from all phases of the study, how they relate to each other and to the published literature is presented in Chapter 9. This chapter also considers the strengths and limitations of the fieldwork and summarises the study as a whole.

The thesis concludes with Chapter 10; the conclusions and recommendations, which summarises the research, policy and practice implications.

The final sections, following the references, are the appendices which contain supplementary and supporting information about the study, a list of presentations and, a published, peer-reviewed paper.

2 Background

Chapter overview

This chapter focusses on the policy background of the MUR service provided by community pharmacists in England.

2.1 Introduction

This section concentrates on medication reviews and specifically the MUR service that is provided by community pharmacists in England. MURs were introduced in 2005 as part of the new Community Pharmacy contract (NHS Employers and PSNC, 2013a). Over the years there have been several updates to this guidance such as the introduction of national target groups, which are discussed below.

2.1.1 Types of medication review

In the published literature the term 'medication review' encompasses many different types of activity conducted by different healthcare professionals (HCPs), in different locations. For clarity, it is essential to define what is meant by the different terms used. A synopsis of the most common types of medication review specific to England is presented below:

1. ***Prescription review***: practical medicines-management review to improve the safety, clinical and cost-effectiveness of the prescription, conducted without the patient.
2. ***Compliance and concordance review:*** (also called an adherence review in some references, this is akin to a MUR conducted by a community pharmacist in England): to find out about the patient's beliefs about medicines and how they are taking them, conducted with the patient.
3. ***Clinical medication review***: consideration of the patient's medication with regard to their conditions and symptoms with access to the medical notes, laboratory tests and the patient.
4. ***Clinical medication review and prescribing***: the same type of review as point 3, but the HCP conducting the review is able to prescribe or adjust the doses of medication.

(Blenkinsopp, Bond and Raynor, 2012; Hatah *et al.*, 2014)

The location of these medication reviews will also vary with prescription reviews and clinical medication reviews most likely to occur in the GP surgery, conducted by the GP or a practice-based pharmacist, while compliance and concordance reviews usually take place in a community pharmacy, conducted by the pharmacist.

2.1.2 Services provided by community pharmacists in England

2.1.2.1 MURs and PD-MURs

Community pharmacies are independent contractors which provide services to the NHS; the services provided are categorised as essential, advanced or locally commissioned:

- ***Essential services*** cover aspects such as dispensing, providing advice about medicines, self-care and healthy lifestyles, clinical governance and disposal of unwanted medicines (PSNC, 2018d).
- ***Advanced services*** cover six different activities including MURs and the new medicine service (NMS) (PSNC, 2018a).
- ***Locally commissioned services*** are agreed locally between community pharmacies and Clinical Commissioning Groups (CCGs), local authorities, or local NHS England teams, and can include services such as providing a minor ailments service, home delivery service, providing emergency hormonal contraception, needle exchange or stop smoking services (NHS Digital, 2017a; PSNC, 2018e).

MURs were introduced in England in 2005 as the first advanced service to be provided by community pharmacies. There have been changes to the service since this time, most notably the introduction of target groups in 2011 and the addition of further target groups in 2015. To undertake MURs, pharmacists must comply with the rules around the provision of essential services, they must hold a MUR certificate and have a suitable private consultation area within the pharmacy for the MUR to take place (NHS Employers and PSNC, 2013a).

The aim of a MUR is:
"…with the patient's agreement, to improve the patient's knowledge and use of drugs
by in particular –
(a) establishing the patient's actual use, understanding and experience of taking drugs.
(b) identifying, discussing and assisting in the resolution of poor or ineffective use of drugs by the patient.
(c) identifying side effects and drug interactions that may affect the patient's

compliance with instructions given to them by a health care professional for the taking of drugs.
(d) improving clinical and cost effectiveness of drugs prescribed to patients, thereby reducing the wastage of such drugs."

(NHS Employers and PSNC, 2013a)

MURs are not a full clinical review of a patient's medication, an agreement to change medication, a discussion about a patient's medical condition or a review of treatment based on test results (PSNC, 2018j). This is partly because the community pharmacist does not have access to the patient's GP record or medical notes. Pharmacists providing the MUR service must be accredited to do so by completing an assessment based on the national competency framework (PSNC, 2018m).

The MUR should take place in a private consultation area which is signposted as such, the space should contain seating and the pharmacist and the patient must able to speak in confidence without being overheard (PSNC, 2018g). Patients must provide written consent to participate in the MUR process (PSNC, 2018f). The pharmacist is required to keep records of any MURs undertaken using a nationally agreed dataset which captures details of the patient, which target group they belong to, number of medicines taken, advice given, any action taken and the outcome of the MUR consultation (PSNC, 2018h). If during the MUR consultation, a pharmacist has identified an issue that the patient's GP needs to be informed about, they should complete the agreed MUR feedback form and send it to the GP. If necessary, they should also telephone or speak to the patient's GP. The GP surgery can then follow-up the patient in the manner that they see fit for the issue identified during the MUR (PSNC, 2018b).

MURs were designed to be conducted in the community pharmacy but pharmacists can apply to NHS England to conduct MURs in other locations such as GP surgeries, care homes, patients' homes or over the telephone (PSNC, 2018c).

Patients should normally only have one MUR consultation per year unless the pharmacist believes that their circumstances have changed sufficiently to warrant another MUR consultation sooner. If a pharmacist deems a patient's circumstances have changed, they are able to conduct a MUR and it is recommended that they document the reason for conducting

more than one MUR in a 12 month period for that particular patient (NHS Employers and PSNC, 2013a).

Community pharmacists are currently paid £28 per MUR consultation and they are permitted to conduct up to 400 MURs per year in each pharmacy (NHS Employers and PSNC, 2013a). From 1st January 2015, there has been a requirement for pharmacists to conduct 70% of the MURs in each financial year on patients in national target groups. The four national target groups are as follows:

- ***High-risk medicines***: Patients taking certain high-risk medicines. The following groups of medicines are classified as high risk for the purposes of MURs: NSAIDs, anticoagulants (including low molecular weight heparin), antiplatelets and diuretics.
- ***Post-discharge***: Patients taking two or more medicines, who have recently been discharged from hospital and have had changes made to their medicines while they were in hospital. Ideally patients discharged from hospital will receive a MUR within four weeks of discharge but in certain circumstances the MUR can take place within eight weeks of discharge. This is referred to as a PD-MUR in this study.
- ***Respiratory***: Patients taking two or more medicines for respiratory disease. One medicine must be from the following groups: adrenoceptor agonists, antimuscarinic bronchodilators, theophylline, compound bronchodilator preparations, corticosteroids, cromoglicate and related therapy, leukotriene receptor antagonists or phosphodiesterase type-4 inhibitors.
- ***Cardiovascular***: Patients at risk of, or diagnosed with, cardiovascular disease and regularly being prescribed at least four medicines, at least one of which must be from the following categories: cardiovascular medicines, drugs used in diabetes or thyroid and anti-thyroid drugs.

(PSNC, 2015)

These target groups have been chosen based on which patients are most likely to gain benefit from a MUR. The medicines on the high-risk list were chosen based on the fact that they are associated with preventable harm due to missed doses, patients taking too much or using them incorrectly and a MUR with a community pharmacist could prevent this occurring (NHS Employers and PSNC, 2013a).

2.1.2.2 New Medicine Service

The NMS was introduced in October 2011 as an additional advanced service that could be provided by community pharmacists in England (PSNC, 2018k). Hospital pharmacists can refer eligible patients to their community pharmacist for this service in a similar way as for PD-MURs. Patients may qualify for both the NMS and a PD-MUR dependent on the changes made to their medicines whilst in hospital.

The aim of the NMS is for patients to get additional support when they are commenced on certain medicines. The rationale for this is so that patients have:

- Increased adherence to their new medicine.
- Increase patient engagement with their medicine and condition.
- Reduced waste of medicines.
- Reduced hospital admissions due to ADRs.
- Increased reporting of ADRs through the Yellow Card reporting scheme.

(PSNC, 2018k)

The NMS covers certain medicines specified by BNF chapter for four conditions which are: asthma and chronic obstructive pulmonary disease (COPD), type 2 diabetes, antiplatelet or anticoagulation therapy and hypertension (PSNC, 2018l). Patients can be recruited to the NMS when they present a prescription for an eligible medicine to the community pharmacy for the first time or if they are referred by a hospital where an eligible medicine was initiated. If no hospital to community referral takes place the patient is not eligible for the NMS even if they are receiving a specified medicine for the first time from their community pharmacy (NHS Employers and PSNC, 2013b). Once a patient has been given information about the NMS and provided written consent to take part, they have a consultation with the community pharmacist. The pharmacist checks adherence, whether the patient is experiencing any problems with the medicine they have been prescribed and provision of any additional information the patient requires about the medicine or their condition. The patient then has a follow-up consultation after 14 to 21 days to check adherence, to determine if any problems have manifested themselves during this time and again to provide information to the patient if necessary. If the patient is experiencing problems with the medicine, the community pharmacist may refer them back to their GP for further management. The community pharmacy is currently paid between £20 and £28 for each NMS depending on the total number of NMS consultations they provide in a month (NHS Employers and PSNC, 2013b).

An NHS commissioned review of the NMS found that it increased patients' adherence to their medication by approximately 10%. Patients who participated in the NMS cost the NHS £215 compared to £260 for those receiving standard care, giving a saving of £45 per NMS. This reduced to a non-statistically significant saving of £21 when the cost of providing the service was accounted for. Patients had better outcomes and even though there were increased costs for the service as community pharmacists were remunerated, this was offset by a reduction in other contacts made by the patient with the NHS, resulting in an overall cost saving. The NMS was also well received by patients (Elliott *et al.*, 2014).

If patients discharged from hospital do not fulfil the criteria for a PD-MUR, they may qualify for a NMS referral instead. Hospital pharmacists should consider referring patients for these community pharmacist services to help patients to adhere to a new regime of medication after a hospital discharge and also to ensure that patients receive the information they need to gain the most out of their medicines to benefit their overall health.

2.1.3 Community pharmacy MUR statistics

In 2016/17 there were 11,699 community pharmacies in England and they dispensed over 1 billion prescription items; the average number of prescription items dispensed each month per community pharmacy was 7,218 (NHS Digital, 2017a). These data cover only the population of England, which was 54.7million people; this equates to 21 community pharmacies per 100,000 population (NHS Digital, 2017a). The types of community pharmacies were split into independent and multiple contractors as follows: 4,434 (37.9%) independent contractors (having ≤5 pharmacies) and 7,265 (62.1%) multiple contractors (having ≥6 pharmacies) (NHS Digital, 2017a).

From the total number of community pharmacies in England, 11,244 (96.1%) conducted over 3.3million MURs at a cost to the NHS in England of £93.6million in 2016/17 (NHS Digital, 2017a; PSNC, 2018i). The average number of MURs per pharmacy was 300 (NHS Digital, 2017a).

2.2 Summary of Background chapter

This chapter has sought to describe MURs and the current policy surrounding them. In the present climate of reduced financial support from Government departments, and with the NHS in England spending almost £100million per year on the provision of the MUR service, it is important to ensure that the money is being spent wisely on evidence-based interventions that will benefit patients.

There are many published studies that focus on MURs in the UK, as well as similar schemes in other countries. The aim of the next chapter is to provide an overview of the literature around hospital admissions generally, medicines-related hospital admissions, medication reviews and opinions of the individuals involved in medication reviews.

3 Literature Review

Chapter Overview

This chapter will summarise the pertinent published literature that underpins the rationale for this study. In the first instance, it considers emergency hospital admissions and readmissions in England followed by a review of the role medicines play in contributing to this. It then examines the evidence-base for medication review and how tools such as this can potentially mitigate some of the problem. Finally, the opinions of pharmacists and others involved in the medication review process will be summarised. This chapter will 'set the scene' for the current study and provide a rationale for the different stages of the research process that were conducted.

3.1 Structure of the literature review

The literature review will follow the structure detailed in Figure 3-1.

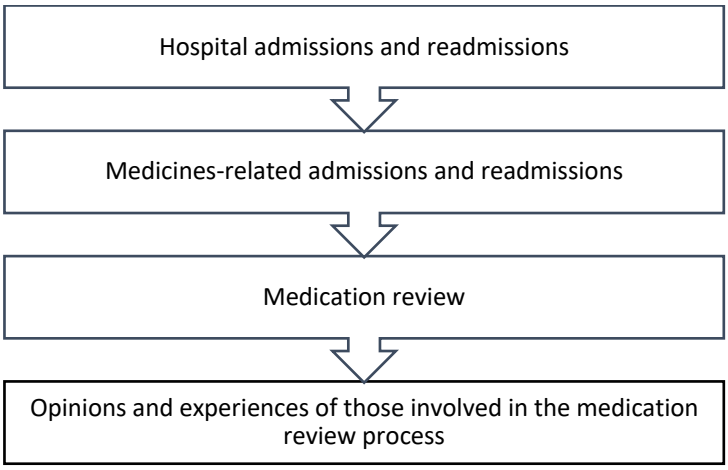


Figure 3-1 Structure of literature review

3.2 Identification of published papers

Before embarking on any fieldwork, it was critical to review the literature to establish the base on which to start designing a study to discover more about the place of patients and community pharmacists in the post-discharge medication review system and suggest improvements to reduce the problem of medicines-use resulting in an admission, or

readmission to hospital. The initial search of the literature was conducted using Medline (from 2000 to 2013), Embase (from 2000 to 2013), Cumulative Index to Nursing and Allied Health Literature (CINAHL) (from 2000 to 2013), and by searching the reference lists of the papers identified as useful. The search strategies used can be found in Appendix A. This was supplemented with internet searches, identifying articles in professional journals through hand-searching, and subscribing to email table of contents circulation lists to locate further papers of interest. Initially, only systematic reviews were examined to gain an overview of the subject area. This allowed a wide range of individual studies to be identified from the reference lists. Since several years have elapsed since the literature searches were first completed in 2013/14, at the time of writing-up in 2018, further searches were conducted to update aspects of the literature review.

3.3 Hospital admissions and readmissions

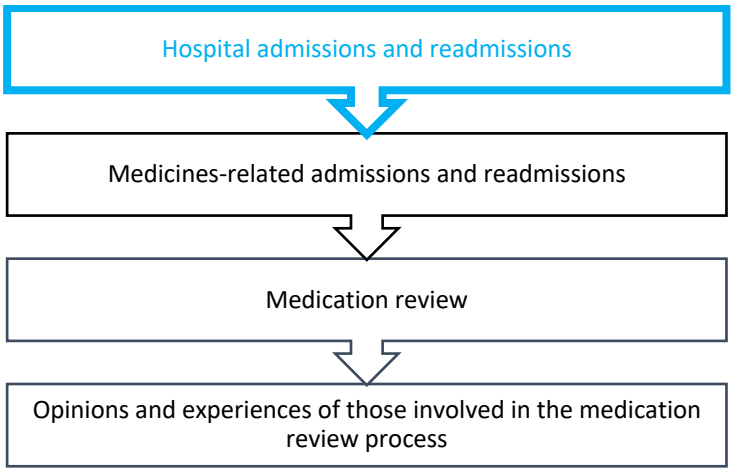


Figure 3-2 Literature review: Area One - hospital admissions and readmissions

In this section, emergency admissions to hospital will be considered, followed by readmissions to hospital. Then, the medicines that are most commonly identified as being the cause of a hospital admission will be explored.

3.3.1 Emergency admissions to hospitals in England

The NHS collects data about every admission, emergency department (ED) attendance and outpatient appointment in England and stores them in a database called HES. These data are primarily collected for payment purposes but can also be used for research and healthcare planning (NHS Digital, 2018b). Each HES record contains information about diagnoses, operations, patient's demographic details, administrative details of the admission and discharge and geographical information about location of treatment and where the patient lives (NHS Digital, 2018b). These data can be used to reveal trends in hospital activity in England and determine whether they have changed over time.

In 2011/12, at the outset of the current study, there were 17.5 million finished consultant episodes (FCEs) which included 5.2 million emergency admissions to hospitals in England. For the financial year 2017/18, there were 20.0 million FCEs and 6.1 million emergency admissions (NHS Digital, 2018a). This represents a 14.7% increase in FCEs and a 16.4% increase in emergency admissions over this time period. NHS Digital has stated that between 2007/8 and 2017/18 there was a 28% increase in emergency hospital admissions (NHS Digital, 2018a) and the greatest increase was in admissions for the 65 to 84 year old age group; (NHS Digital,

2017d). These data demonstrate that year-on-year, emergency admissions to NHS hospitals in England are still increasing.

3.3.2 Emergency readmissions to hospitals in England

Once patients have been discharged from hospital there is a potential that they could be readmitted, either for the same or a different problem. Hospital readmissions are often used as a quality indicator with the suggestion that high readmission rates are associated with poor standards of in-patient care during an initial, or index, admission. In 2010, the UK Government decided to withhold payment from hospital Trusts for patients readmitted within 30 days of an elective admission and this was later extended so that Trusts would also be penalised for a certain locally agreed proportion of readmissions following emergency admissions (Department of Health, 2010b). The aim of this policy was to ensure that patients received optimum care during their primary admission and were not discharged too early.

The use of readmissions as a measure of quality is controversial as readmissions can occur for a variety of reasons. Readmissions can be affected by many factors including the 'severity, predictability and chronicity of the patient's underlying condition' with factors such as social support and co-morbidities also having an impact (Clarke, 2004). In fact, for some patients a readmission could indicate a positive aspect of care, for example, if they have a condition that may require frequent admissions, such as cancer (Clarke, 2004).

A recent study from the UK aimed to classify emergency 30-day readmissions and identify ways of reducing them (Blunt, Bardsley, Grove, & Clarke, 2014). The authors used HES data from 2004 to 2010 and found that there were 5.8 million emergency 30-day readmissions during this period, which gave a readmission rate of 7.0%. Of the patients that were readmitted, only 5.3% were due to a complication of an index admission. When the preventability of readmissions was assessed, 30% of all readmissions were classified as 'potentially preventable' (Blunt *et al.*, 2014).

The use of routinely collected data to monitor readmissions is complicated by the fact that hospitals are changing the way that they deliver services, with an increase in the use of frailty units and ambulatory care units which have altered the way patients are managed in hospitals (Future Hospital Commission, 2013). Over time the way that hospital admissions are coded and reported in HES datasets has also changed (HSCIC, 2013b). There are also other

confounding factors that can affect a particular hospital's readmission rate including: socioeconomic status of patients, whether patients are transferred to other locations for rehabilitation, variations in length of stay, self-discharges, admissions for issues unrelated to the initial admission and differences in coding (HSCIC, 2013a).

Previously, NHS Digital published data that showed the number of readmissions to hospital within 28 days of discharge. The latest published data covered the financial year 2011/12 so a direct comparison between readmission and admission data was not possible for more recent years (HSCIC, 2013a). The National Audit Office emergency admission report stated that there were 5.3 million emergency admissions to hospital in England between 2012 and 2013, costing approximately £12.5 billion. They reported that 19%, or over a million emergency admissions, were in fact readmissions (National Audit Office, 2013) that cost the economy over £2.4 billion (NICE, 2015a).

Since this original literature review was written, other reports have been published that show the more recent impact of readmissions on the NHS. Healthwatch England published a report in October 2017 titled: What do the numbers say about emergency readmissions to hospital? (Healthwatch England, 2017). The data for 2016/17 showed that for the 72 trusts that submitted data, the number of emergency readmissions increased from 372,805 in 2012/13 to 457,880 in 2016/17. Of these emergency readmissions, 21.61% occurred in the first 48 hours after the initial discharge (Healthwatch England, 2017). The authors note that the situation was complicated, and readmissions do not necessarily indicate substandard care. The report recommended that trusts collect more detailed data to allow them to understand and improve their readmission rates and for NHS Digital to recommence the publication of the annual readmission reports (Healthwatch England, 2017).

A more recent report from Quality Watch (a collaboration between the Health Foundation and The Nuffield Trust) reported that between 2010/11 and 2016/17 the total number of emergency readmissions each year increased from 1,157,570 to 1,379,790. This represents an increase of 19.2% and far outstrips the 10.5% increase in the number of all hospital admissions, over the same time period (Quality Watch, 2018). The Quality Watch team also found that between 2010/11 and 2016/17, potentially preventable readmissions increased by 41.3% from 130,760 to 184,763, giving an increase in the rate of potentially preventable readmissions from 0.8% to 1.1% (Quality Watch, 2018).

A recently published paper examined hospital readmissions to 150 NHS Trusts in England using HES data from 2006 to 2016 (Friebel *et al.*, 2018). They found that there had been a statistically significant increase in 30-day readmissions from 6.56% in 2006/7 to 6.64% in 2015/16 ($p<0.01$). This represented an absolute increase in emergency readmissions of 80,384; from 338,565 out of 5,204,263 emergency admissions in 2006/7 to 418,949 out of 6,219,153 emergency admissions in 2015/16. The paper suggested that different types of data need to be combined with readmission data to determine how the emergency readmission rate can be decreased (Friebel *et al.*, 2018).

These data show that emergency readmissions are still a burden for the NHS and any measures that can be taken to minimise the proportion of patients that are readmitted to hospital should be investigated further.

3.4 Medicines-related hospital admissions and readmissions

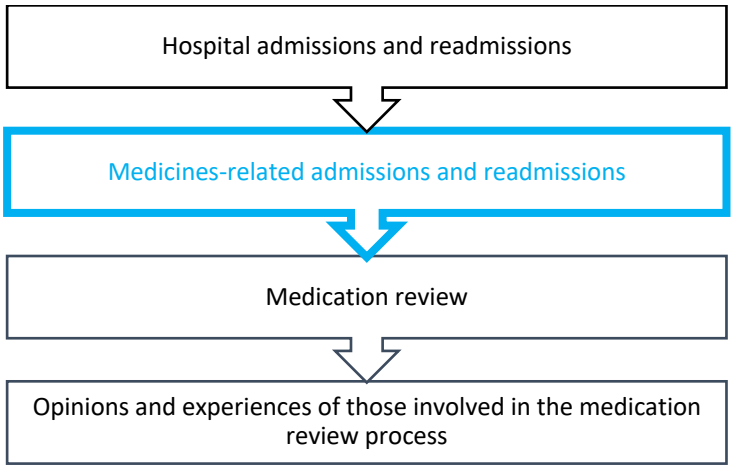


Figure 3-3 Literature review: Area Two – Medicines-related admissions and readmissions

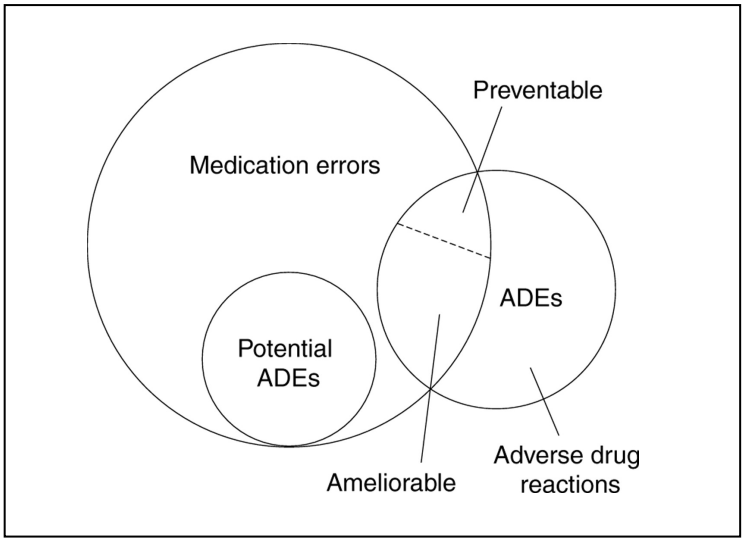
The previous sections have outlined the current situation in England with regard to hospital admissions and readmissions. This section will initially provide background information about the terminology used in the studies that involve medicines-related problems. Following this will be an examination of the published literature concerning how medicines contribute to hospital admissions and readmissions.

3.4.1 Background to adverse drug event terminology

Before the published data around medicines-related admissions and readmissions is reviewed, it was important to outline the different terminology that was used in the published papers to describe adverse drug reactions, adverse drug events (ADEs) and related terms.

3.4.2 ADRs and ADEs

In the published literature there are a variety of different terms used to describe a medicines-related problem that results in a negative outcome for the patient. A summary diagram of the different terms and how they are interrelated was published in the journal Quality and Safety in Healthcare in 2004 (Morimoto *et al.*, 2004).



From, Morimoto *et al.*, (2004), reproduced with permission

Figure 3-4 Relationship between ADEs, potential ADEs and medication errors

The authors also defined the various terms that were used to describe ADEs due to medication:

- ADE - an injury due to medication.
- Potential ADE - the medication could have caused an injury but in that particular situation it did not.
- Preventable ADE - an injury due to an error in the use of a medication.
- Non-preventable ADE - also known as an ADR, resulting from an injury due to medication where no error was involved.
- Ameliorable ADE - the injury could have been less severe or lasted for less time, if a different course of action had been taken.
- Non-ameliorable ADE - an injury where the severity or duration could not have been reduced.

(Morimoto *et al.*, 2004)

The authors categorised ADRs as a subset of ADEs and noted that, ADEs could occur spontaneously or be caused by medication error, although not all medication errors result in an ADE. Depending on the location, the authors found that approximately a third to a half of all ADEs were associated with medication errors (Morimoto *et al.*, 2004).

There have been various definitions of the term ADR. In 1972, The World Health Organisation defined an ADR as 'a response to a medicine which is noxious and unintended, and which occurs at doses normally used in man' (WHO, 2002). In the year 2000, Edwards and Aronson, proposed an alternative definition: 'an appreciably harmful or unpleasant reaction, resulting from an intervention related to the use of a medicinal product, which predicts hazard from future administration and warrants prevention or specific treatment, or alteration of the dosage regimen, or withdrawal of the product'(Edwards and Aronson, 2000). And, an EU directive in 2010, clarified the definition of an ADR to include 'noxious and unintended effects resulting not only from the authorised use of a medicinal product at normal doses, but also from medication errors and uses outside the terms of the marketing authorisation, including the misuse and abuse of the medicinal product' (EU Directive, 2010). The terms ADE and ADR are often used interchangeably in the literature and this can lead to difficulties when interpreting the results of studies (Lavan and Gallagher, 2016). The majority of studies report the use of the WHO definition despite its criticism by Edwards and Aronson (2000).

3.4.3 Identifying medicines-related problems in practice

3.4.3.1 Sources of data for studies of ADRs

ADRs are under-reported, both in primary and secondary care settings (Hazell and Shakir, 2006); this means that it can be difficult to determine the impact of medicines-related problems on hospital admissions and readmissions. It has been suggested that the diagnosis of ADRs is often by the process of exclusion (Hazell and Shakir, 2006).

There are a variety of different sources of information and methods for collecting data about ADRs. Morimoto *et al.*, (2004) described three methods their research group had used in primary care settings: (i) collecting practice data (which included charts, laboratory data, prescription data and administrative data), (ii) soliciting reports from HCPs and (iii) surveying patients. In secondary care settings, the sources of information include: medical notes, laboratory reports, prescription charts and discharge summaries. Each type of information can be used on its own or in combination. Data can be collected by various different individuals including HCPs, assistants or students. The use of information technology (IT) can also assist in these tasks which can reduce subjectivity but relies on correct diagnosis, coding and accurate data entry (Morimoto *et al.*, 2004).

Other options for data collection include the use of administrative data and coding, such as the previously mentioned use of the HES database, and also analysis of the reports received by the Yellow card scheme in the UK (Dobson, 2007).

3.4.3.2 Assessment of causality, severity and preventability of ADEs

Causality

There are many published studies that detail the medicines that are most likely to result in a medicines-related hospital admission; these medicines are often referred to as high-risk. When reviewing studies, it is important to consider how the authors have made the decision that a medicine has been the cause of the patient's problem and resulted in the hospital admission. It can be difficult to determine whether the signs and symptoms that a patient is displaying and experiencing are due to the medicine or other factors.

There are different scoring systems that can be used to judge whether a medicine is the culprit; one of the most commonly used is known as the Naranjo criteria (Naranjo *et al.*, 1981). This ten question assessment tool is an ADR probability scale that when completed gives a score that can be used to determine the certainty that an ADR has occurred (Naranjo *et al.*, 1981). The other assessment tool that studies use is the WHO-UMC criteria which is a six point scale that can be used to determine the probability that an ADR has occurred (WHO-UMC, 2000). When reviewing studies that have investigated the medicines most commonly implicated in hospital admissions it is important to consider how the authors decided the medicine was the cause of the ADE.

Severity

ADEs are often categorised using an arbitrary scale based on the subjective opinions of clinicians or researchers. The Hartwig and Siegal severity criteria is an eight point scale that allows the severity of ADEs to be classified using an objective approach based on severity of the level of harm and the extent of medical intervention required (Lavan and Gallagher, 2016).

Preventability

Many studies also attempt to categorise ADEs based on whether they were idiosyncratic or predictable and therefore, to some extent preventable. One of the most common rating scales was developed by Hallas and is a four-point scale denoting the certainty with which the medicines were the cause of hospital admission (Hallas *et al.*, 1990).

3.4.4 Medicines-related hospital admissions – scale of the problem and medicines involved

3.4.4.1 Systematic reviews

As already stated, in 2016/17 there were 5.8 million emergency admissions to hospitals in England (NHS Digital, 2017d) and a proportion of these admissions would have been medicines-related . Many authors have conducted systematic reviews examining medicines-related admissions to hospital and these are detailed in Table 3-1. These reviews have found that between 3.7 and 7.7% of all hospital admissions were medicines-related; excluding studies of only drug-drug interactions (DDIs) (Dechanont *et al.*, 2014) and those that reported results as a range from the included studies (Leendertse *et al.*, 2010).

Another meta-analysis, worthy of mention here, has been published which included 16 papers concerning preventable ADR-related hospital admissions. As the study focussed only on preventable admissions, rather than all admissions, it was unsuitable for inclusion in Table 3-1. It showed that in the out-patient setting, 2% of patients experienced a preventable ADR and 52% of ADRs were preventable (Hakkarainen *et al.*, 2012).

A further non-systematic review of observational studies analysed 22 papers specifically focussed on medicines-related hospital admissions due to ADRs in Europe. It found that a median of 3.6% (range 0.5% - 12.8%) of all hospital admissions were due to ADRs. Twenty-three studies analysed data to determine the rate of fatal ADRs and the highest percentage found was 0.49% of all admissions (Bouvy, De Bruin and Koopmanschap, 2015).

Table 3-1 Systematic reviews focussing on medicines-related hospital admissions

Study (year)	Study aim	Number of studies included	Meta-analysis conducted?	Definition of ADR	Percentage of admissions that were medication-related	Medicines most commonly implicated	Comments
Beijer and de Blaey (2002)	To quantify ADR-related hospital admissions.	68	X Studies too heterogenous.	WHO definition.	4.9% +/- 0.1% (Mean +/- Confidence interval (CI))	Not stated.	ADR-related admissions four times higher in elderly population; 16.6% v. 4.1%.
Dechanont *et al.*, (2014)	To estimate the prevalence of hospital admissions or hospital visits associated with drug-drug interactions (DDI).	13	✓	Not stated.	1.1% (median) (IQR 0.4 – 2.4%)	Warfarin NSAIDs	DDIs are a subset of medication-related admissions. More DDIs identified with medical record review and retrospective studies.
Howard *et al.* (2007)	To estimate the percentage of preventable drug-related hospital admissions.	13	X Studies too heterogenous	Clinical judgement or variety of published tools.	3.7% (median) 1.4 – 15.4% (range)	Antiplatelets Diuretics NSAIDs Anticoagulants	Most common causes were adherence and prescribing problems.
Kongkaew, Noyce and Ashcroft (2008)	To determine the prevalence of hospital admissions due to ADRs.	25	X Studies too heterogenous	WHO definition.	5.3% (median) 2.7 – 9.0% (IQR)	NSAIDs Cardiovascular drug Central nervous system (CNS) agents	Combining methods for ADR detection resulted in higher prevalence of ADRs compared to medication review alone.
Lazarou, Pomeranz and Corey (1998)	To estimate the prevalence of serious and fatal ADRs in hospital patients.	39 in total, 21 for patients admitted to hospital due to an ADR.	✓	WHO definition.	4.7% (95% CI 3.1 – 6.2%)	Not stated.	0.13% (95% CI 0.04 – 0.21%) ADRs causing admissions to hospital were fatal. Only studies from US included.

Leendertse *et al.*, (2010)	To explore the influence of study characteristics (setting, population, outcome, method of data collection and continent) on the prevalence of medication-related hospitalizations.	95	X	WHO definition.	0.1 – 54% (range)	Not stated.	Higher prevalence of ADRs in all hospital admissions compared to emergency admissions only. Medication chart review gave higher prevalence of medicines-related hospitalisations compared to spontaneous reports or database methods.
Roughead *et al.*, (1998)	To examine the extent of drug-related hospital admissions in Australia.	14	X	Strand *et al* definition of drug-related problems.	2.4 – 3.6%	Cytotoxics NSAIDs or aspirin Cardiovascular drugs Anticoagulants CNS depressants Corticosteroids	Focussed on Australian papers only.
Wiffen *et al.*, (2002)	To estimate the incidence of ADRs resulting in hospital admissions, estimate the burden of ADRs, identify risk factors for ADRs and identify research into reducing the impact of ADRs.	108	X	WHO definition.	5.5% in prospective studies 7.7% in retrospective studies	60-70% of all ADRS in studies were due to: Antibiotics Anticoagulants Digoxin Diuretics Hypoglycaemics NSAIDs	
Winterstein *et al.*, (2002)	To estimate the prevalence of preventable drug-related hospital admissions and to explore if selected study characteristics affect prevalence estimates.	15	X Studies too heterogenous.	Investigators' judgement.	7.1% (median) 5.7 – 16.2% (IQR)	Not stated.	More than half were preventable and caused by inappropriate care or medication error.

3.4.4.2 Individual studies

Many of the systematic reviews included in Table 3-1 were published several years ago and there are some very large studies of medication-related hospital admissions that are worthy of further description.

Table 3-2 shows a summary of some of the important individual studies that have been conducted to investigate the extent of medication-related admissions. The studies were all carried out using data collection from individual patients using techniques such as case note review and patient interview. There are advantages and disadvantages to using these methods; advantages include the ability to review potential medicines-related admissions on a case-by-case basis in real time. The disadvantages include having to rely on HCPs correctly identifying medicines-related problems and accurate information recall by patients.

The studies demonstrate wide variation in the percentage of hospital admissions that are due to medicines-related problems; between 4.2% and 20.9% (Somers *et al.*, 2010; Pedros *et al.*, 2014). The potential explanations for these differences are:

- studies conducted in **different countries** with different healthcare systems and infrastructures.
- **various methods of identification** of medicines-related admissions (as mentioned previously, some methods, such as medication chart review (Leendertse *et al.*, 2010) result in higher percentages of medicines-related hospital admissions than other methods and combining different techniques is preferable to using only one technique (Morimoto *et al.*, 2004; Kongkaew, Noyce and Ashcroft, 2008)).
- **retrospective and prospective study designs** (retrospective data collection methods gave higher percentages of medicines-related admissions (Kongkaew, Noyce and Ashcroft, 2008; Dechanont *et al.*, 2014)).
- **varying definitions** of ADE and ADR.

The majority of studies conducted in developed countries had a medication-related admission rate of between 4.2% and 6.5%.

Table 3-2 Individual studies of medication-related hospital admissions

Study (year)	Location and country of study	Aim of study	Number of participants	Study design	Definition of medicines-related admission	Percent of medication-related admissions	Medicines most commonly implicated	Other results
Bergman and Wiholm (1981)	University hospital. Sweden.	To evaluate the role of different types of drug-related problems in causing hospital admissions.	285	Case note review and patient interview.	WHO criteria for ADRs. Expert opinion.	16%	Not stated.	ADRs caused more admissions in women.
Brvar *et al.*, (2009)	University hospital. Slovenia.	To evaluate the frequency of ADR-related admissions.	520	Case note review.	WHO criteria for ADRs. WHO criteria for causality.	5.8%	Aspirin, warfarin, cardiovascular medicines, antineoplastic and immunosuppressive medicines, corticosteroids, antidiabetic agents.	ADRs more common in older patients
Cunningham *et al.*, (1997)	Unspecified hospitals in Scotland. UK.	To assess the incidence of drug-related problems in elderly patients.	1 011	Case note review.	Hallas criteria for causality and preventability.	5.3%	NSAIDs, corticosteroids, opioids, anti-parkinsonian drugs, diuretics, cardiovascular medicines.	
Davies *et al.*, (2009)	Teaching hospital. UK.	To explore the impact of ADRs on NHS hospital in-patients.	3 695	Case note review.	Edwards and Aronson definition of ADR. Naranjo criteria for causality. Hallas criteria for preventability. Hartwig scale for severity.	14.7%*	Loop diuretics, opioids, systemic corticosteroids, inhaled beta-agonists, antibiotics, anticoagulants.	ADRs more common in women, older patients and medical patients also link with number of medicines taken. Majority of ADRs caused by drug initiated in hospital.

Howard *et al.*, (2003)	Teaching hospital. UK.	To estimate the proportion of admissions associated with drug-related morbidity.	4 093	Case note review.	Hallas criteria for causality. Hepler classification for drug-related admission.	6.5%	NSAIDs, anti-platelets, antiepileptics, hypoglycaemics, diuretics, inhaled corticosteroids, cardiac glycosides, and beta-blockers.	Underlying causes were prescribing, monitoring and adherence problems.
Koh, Kutty and Li, (2003)	Acute-care hospital. Singapore.	To estimate the incidence of drug-related hospital admissions.	347	Case note review.	Hallas criteria for causality and preventability.	10.8%	Not stated.	All medication-related admissions were judged to have been avoidable.
Kongkaew *et al.*, (2013)	District general and teaching hospital. UK	To determine predictors for hospital admissions associated with ADEs.	3 904	Case note review and patient interview.	Modified WHO criteria for ADRs. Hallas criteria for causality. National Patient Safety Agency criteria for severity. Hepler and Strand criteria for preventability.	11.2%	Anti-platelets, anticoagulants, diuretics, ACE inhibitors, antiepileptics.	47.6% of medication-related admissions were avoidable. Four variables predictive of experiencing an ADR: age, length of time since starting new drug, total number of prescribed medicines and type of hospital admitted to.
Leendertse *et al.*, (2008)	University, teaching and general hospitals. Netherlands.	To identify the frequency and preventability of medication-related hospital admissions.	12 793	Case note review.	WHO definition of ADRs. Modified Kramer algorithm for causality. Modified Schumock and Thornton algorithm for preventability.	5.6%	Not stated.	Medication-related admissions more common in patients with impaired cognition, ≥ 4 co-morbidities, dependent living, impaired renal function, non-adherence to medication and polypharmacy.

Pedros *et al.*, (2014)	University hospital. Spain.	To assess the prevalence of hospital admissions related to ADRs.	4 403	Case note review with patient interview if required.	EU definition of ADR.	4.2%	Diuretics, anticoagulants, antiplatelets, ACE inhibitors and angiotensin-2 receptor blockers, NSAIDs.	ADRs causing admission more common in older patients and those taking more medicines.
Pirmohamed *et al.*, (2004)	District general and teaching hospital. UK.	To ascertain the burden of ADRs.	18 820	Case note review with patient interview if required.	Edwards and Aronson definition of ADRs. Naranjo criteria of causality. Hallas criteria for preventability.	6.5%	Aspirin, NSAIDs, diuretics, warfarin, ACE/A2RAs, antidepressants, beta-blockers, opioids, digoxin, prednisolone, clopidogrel.	ADRs significantly more common in older patients and females.
Smith *et al.*, (1997)	University hospital. US.	To determine the percentage of ED patients with drug-related problems who were admitted to hospital.	5 757	Case note review.	Hepler and Strand definition of drug-related problems.	0.63%**	Cardiovascular drugs, electrolytic, caloric or water balance agents.	
Somers *et al.*, (2010)	University hospital. Belgium.	To assess the frequency and type of drug-related problems in patients >65 years, and to assess their contribution to hospital admission.	110	Case note review.	WHO criteria for ADRs. Hallas criteria for drug-related problems.	20.9%	Central nervous system drugs, antidiabetics, respiratory drugs and cardiovascular drugs.	Figure includes admissions where medicines were the dominant reason for the admission or were partly the reason. Patients with drug-related problems took significantly more medicines and were more likely to have been in hospital in the previous 6 months.

Zargarzadeh, Emami and Hosseini (2007)	Teaching hospitals. Iran	To measure the prevalence of drug-related problems leading to hospital admission.	1 000	Case note review.	WHO definition of ADRs. Naranjo criteria of causality. Expert opinion for drug-related problem, preventability and patient outcomes.	11.5%	Not stated.	

*Patients experiencing an ADR during their admission, but they may not have been admitted due to the ADR.

**Proportion of patients attending ED who were then admitted with a medicines-related problem rather than proportion of admitted patients with a medicines-related problem

As well as the individual studies that are detailed in Table 3-2, a published paper was found that specifically focussed on the patient experience of a medicines-related hospital admission. The authors interviewed 15 people who had been admitted to hospital due to an ADR. The patients described the experience as frightening and also felt anger, isolation, resentment and blame. Patients felt that the information they received from the prescriber and communication should be improved (Lorimer, Cox and Langford, 2011).

3.4.4.3 Studies using administrative data

Several authors have used administrative data, such as HES, to investigate medicines-related hospital admissions on a population scale; these studies are summarised in Table 3-3. HES data analyses has shown that 0.35 – 0.90% of hospital admissions in England are due to medicines (Waller *et al.*, 2004; Patel *et al.*, 2007; Wu *et al.*, 2010), and the majority of medicines-related admissions occurred in older people (Patel *et al.*, 2007; Wu *et al.*, 2010). This is a much lower percentage than from the systematic reviews and individual studies already summarised in Table 3-1 and Table 3-2. This discrepancy could be as a result of using routinely collected data; with issues of data quality due to so many different individuals entering information leading to errors during data entry and inconsistencies in coding across different Trusts, along with mis-coding by clinicians. Also, the HES data only cover England, not Scotland or Wales, which could limit generalisability in these populations. Despite these limitations, HES provide a source of vast amounts of data which can still be useful when attempting to discover temporal trends. This was the rationale for conducting preliminary work using the HES database; it allowed an assessment to be made about whether medicines-related hospital admissions were still a problem and were therefore a worthy area for research.

Another study that utilised HES data to identify factors in primary care that were associated with ADR-related hospital admissions between 2010 and 2012 did not report a rate of ADR-related admissions and therefore was not suitable for inclusion in Table 3-3. This study utilised 85 International Classification of Diseases, 10th Edition (ICD-10) codes which indicated an ADR had occurred as well as the 'external' codes which detailed the medicines involved in a hospital admission. The authors showed that ADR-related hospital admissions were more common in very young children, older people and women. Higher rates of ADR-related admissions were also seen in patients with higher deprivation scores amongst other measures (McKay *et al.*, 2015).

Table 3-3 Studies utilising HES and HES-type data

Study	Years studied	Country	Aims	Focus on ADRs or drug-related (DR) admissions	Percentage of admissions due to DRPs/ADRs	Results
Carrasco-Garrido *et al.*, (2010)	2001-2006	Spain.	To estimate the burden of hospital admissions for ADRs.	173 'external cause' codes from ICD-9.	1.69%	Drugs most commonly associated with an ADR-related hospital admission were antineoplastic and immunosuppressive agents, corticosteroids, anticoagulants and antibiotics. The rate of ADR-related hospitalisation was 35.9% in patients 75 years and over.
Patel *et al.*, (2007)	1998 - 2005	England.	To examine the epidemiology of hospital admissions for ADRs, the age distribution and their impact on hospital activity.	85 ICD-10 codes which contained the words 'drug-induced' or 'due to a drug' plus 'Y external cause' codes.	0.5%	Five fastest growing ADRs were: induced haemolytic anaemia, nephropathy, adrenocortical failure, cardiomyopathy and aplastic anaemia. The five fastest growing ADRs as external causes were drugs relating to: water balance, autonomic system, CNS stimulants, cardiovascular system and biologics/vaccines. For the year 2004/5, 69% of all ADRs occurred in patients > 60 years.
Rodenburg, Stricker and Visser (2010)	2000-2005	Netherlands.	To study the differences in ADR-related hospitalizations between the sexes.	Specific codes indicating drug-related hospitalization, known as E-codes.	0.44%	Drugs most commonly associated with hospitalizations: antineoplastic and immunosuppressive drugs, anticoagulants and cardiovascular drugs.
Stausberg and Hasford, (2011)	2003 - 2007	Germany (From 2003-2006; 72-79% of all admissions, for 2007; 10% sample of all hospitals in country).	To assess the frequency and type of drug-related admissions and hospital acquired ADEs.	505 ICD-10 codes indicating an ADE.	0.54 – 0.67%	Figure is for admissions that were *very likely* caused by drug-related problems. 5% of admissions were *possibly* drug-related. Most common cause of DR admission was enterocolitis *Clostridium difficile*.

Waller *et al.*, (2004)	1996 - 2000	England.	To review and describe HES data coded as 'drug induced' to assess the public health impact of ADRs.	59 ICD-10 codes including the words 'drug-induced 'or which indicated 'due to a drug' or a definite ADR plus 'Y external cause' codes.	0.35%	Largest group of drug–induced admissions were mental disorders caused by opioids or multiple psychoactive drugs. When this group was combined with mental disorders due to sedatives/hypnotics they accounted for 74-78% of all drug-induced admissions each year.
Wu *et al.*, (2010)	1999 – 2009	England.	To analyse trends in hospital admissions associated with ADRs.	85 Primary or secondary ICD-10 codes indicating an ADR plus 'Y external cause' codes.	0.9%	Most common drug group implicated in ADRs were systemic agents (19.2%), analgesics (13.3%) and cardiovascular drugs (12.9%). 58.5% of ADR admissions were for patients >65 years, median age 70 years. No differences in ADRs admissions based on socioeconomic status.

3.4.4.4 Which medicines are most implicated in hospital admissions?

The studies summarised in Table 3-1, Table 3-2 and Table 3-3 show that the medicines most commonly implicated in medicines-related hospital admission are (in alphabetical order):

- Antibiotics
- Anticoagulants
- Antiplatelets
- Cardiovascular medicines including diuretics, cardiac glycosides and beta-blockers
- Central nervous system medicines including anti-epileptics, medicines for Parkinson's Disease and anti-depressants
- Corticosteroids
- Cytotoxic medicines
- Medicines used in the treatment of diabetes mellitus
- NSAIDs
- Opioid analgesics

Examples of adverse events that are associated with these medicines are gastrointestinal toxicity with antiplatelets or NSAIDs, failure to optimise treatment for patients with cardiovascular conditions leading to angina or exacerbations of heart failure, and subtherapeutic doses of antiepileptic medicines resulting in seizures (Howard *et al.*, 2003).

The medicines that were most likely to cause a medicines-related hospital admission were relatively consistent across studies and the method of data collection did not appear to alter the list.

These studies have shown that medicines make a significant contribution to hospital admissions, not only in England but around the world and therefore are not dependent on the way healthcare is funded in a particular country. This is an indication of a global issue, suggesting that research is important in this area to try and reduce the burden of medicines-related hospital admissions. The following section will concentrate on medicines-related readmissions.

3.4.5 Medicines-related readmissions to hospital

NICE have highlighted that when patients are discharged from hospital, this transition of care can be a time of heightened risk due to errors or unintended changes in medication, with 30% to 70% of patients affected (NICE, 2015c). A study conducted by Moore *et al.* (2003) in the US, investigated medicines-related errors that occurred when patients were discharged from hospital. They found that 42% of the 82 patients in their study experienced at least one medication-related error (Moore *et al.*, 2003). A systematic review has shown that during transitions of care, 34% of unintended discrepancies are clinically significant and medicines reconciliation alone is insufficient to prevent medicines-related hospital readmissions due to these discrepancies (Kwan *et al.*, 2013). A further systematic review has shown that only 55% of discharge summaries were available to primary care physicians within 48 hours of the patient being discharged from hospital and there were deficiencies in the information provided especially around diagnostic tests performed, outstanding test results and medications (Kattel *et al.*, 2016).

Table 3-4 summarises individual studies that have focussed on medicines-related hospital readmissions.

Table 3-4 Individual studies of medication related hospital readmissions

Study (year)	Location and country of study	Aim of study	Number of participants	Study design	Definitions used	Readmission period in study	Percent of readmissions due to medication	Medications causing most admissions	Other results
Bero, Lipton and Bird, 1991	Non-teaching community hospital. US.	To determine the proportion of patients with a drug-related readmission.	706	Retrospective case note review.	WHO definition of ADR.	6 months.	7%	Cardiovascular medicines, antibiotics, antidiabetics, antiasthmatics, antiepileptics, NSAIDs and aspirin.	76% of medication related readmissions were judged to be potentially preventable.
Bonnet-Zamponi *et al.*, 2013)	Five University-affiliated hospitals and one private clinic. France.	To assess the effect of an intervention on medicines-related readmissions.	348	Randomised controlled trial (RCT).	Edwards and Aronson definition of ADR. Expert opinion and Naranjo criteria for causality.	6 months.	7.5%.	Antithrombotic, antihypertensive and psychotropic drugs.	Intervention reduced medicines-related readmissions, but study was underpowered, and result was non-significant.
Davies *et al.*, 2010	University hospital. UK.	To evaluate the impact of ADRs on readmissions after a period as an in-patient.	1 000	Retrospective case note review.	Edwards and Aronson definition of ADR. Naranjo criteria for causality. Hallas criteria for preventability.	1 year.	18.1%	Aspirin, clopidogrel, diuretics, anti-hypertensives.	New drugs prescribed during index admission caused 1/3 of readmissions within 28 days. Increasing age was a significant factor in readmissions overall.

Dormann *et al.*, (2004)	University hospital. Germany.	To determine if ADRs could be used as predictors of hospitalisations and evaluate the impact of ADRs on hospitalisation costs.	630	Prospective case note review.	WHO definition of ADRs. Naranjo criteria for causality. Schumock and Thornton for preventability.	6 months.	4.2%	CNS drugs, Electrolytic, calorific and water balance drugs, cardiovascular drugs, antibiotics and gastrointestinal drugs.	Occurrence and number of ADRs significantly prolonged length of stay in hospital. 44.3% of ADRs were judged to have been preventable.
Forster *et al.*, (2005)	Urban academic hospital. US.	To determine the incidence of ADEs after hospital discharge and their risk factors.	400	Prospective cohort study using case note review and telephone interviews with patients.	Definitions of ADE, preventable ADE and ameliorable ADE from Institute of Medicine report, 'To err is human'.	24 days	11%	Antibiotics, corticosteroids, cardiovascular medicines, analgesics, anticoagulants, antiepileptics.	27% ADEs were preventable and 33% were ameliorable. 91% ADEs were due to medicine newly started during index admission.
Hauviller *et al.*, (2016)	University hospital. France.	To estimate the rate of hospital re-admission in the patients over the age of 65 years and to describe the ADRs leading to re-admission.	1 000	Case note review.	Edwards and Aronson definition of ADR.	1 year.	8.7%	Anticoagulants, psychotropics and cardiovascular drugs.	Cancer increased the risk of readmission for ADRs (odds ratio (OR) = 7.69 (95% CI 4.59-12.88). 22% of readmissions were considered to be avoidable.

Parekh *et al.*, (2018)	Five teaching hospitals. UK.	To determine the incidence, severity and preventability of medication-related harm post-discharge in older adults; to describe the main types of harm and implicated drugs; to describe health service utilisation and cost associated with harm.	1 280	Case note review and patient interview.	Modified Strand definition for ADR. Naranjo criteria for causality. Morimoto criteria for severity. Hallas criteria for preventability.	8 weeks.	7.8%	Opioids, antibiotics and benzodiazepines.	The most common complications were gastrointestinal and neurological. It was estimated that post-discharge medication-related harm cost the NHS £396 million per year, of which 90% was due to readmissions, and £243 million was deemed to be preventable.
Rothwell *et al.*, (2011)	One regional and two rural hospitals. Australia.	To identify unplanned readmissions due to medications.	170	Retrospective case note review.	Forster definition of medicine-related problem. Australian definitions of causality and preventability. Coleman criteria to assess contribution of medication to readmission.	28 days.	23%	Cardiovascular medicines, antiplatelets, proton-pump inhibitors, iron, analgesics.	87% of medication related readmissions were deemed preventable. Readmissions mainly due to gaps in communication.

Ruiz *et al.*, (2008)	Tertiary hospital. Spain.	To analyse the contribution of ADRs to hospital readmissions.	26 559	Case-control study using patient questionnaires for cases and case note review for controls.	WHO definition of ADR. Expert opinion for causality of ADR. Schumock and Thornton criteria for preventability.	60 days.	4.5%	Warfarin, antihypertensives, diuretics, anticancer drugs, digoxin.	34.6% readmissions were preventable. Significantly increased risk of readmissions if a diagnosis of diabetes mellitus, taking warfarin and the higher the number of drugs being taken.
Stowasser *et al.*, (2000)	Tertiary teaching hospital. Australia.	To assess the contribution of ADEs to unplanned admissions using novel methods.	208	Prospective case note review.	ICD-9 codes indicative of an ADE. Bero methodology to determine causality, contribution and preventability.	30 days.	4.3%	Not stated.	No readmissions were coded as being due to ADEs using the ICD-9 system.
Teymoorian, Dutcher and Woods, (2011)	University teaching hospital. US.	To evaluate the association between ADRs and subsequent hospital readmission in adults aged 80 and older.	282	Retrospective case note review.	WHO definition of ADRs.	30 days.	23.4%	Anticoagulants, antiplatelets, diuretics, antihypertensives, opioids.	Patients with an ADR-related admission were taking 11.7 medicines on average.

Witherington, Pirzada and Avery, (2008)	University teaching hospital. UK.	To identify communication gaps at hospital discharge for older people who are readmitted within 28 days.	108	Case note review.	Hallas criteria for causality. Hepler criteria for preventability. Holland criteria for contribution of medicine to readmission.	28 days.	38%	Cardiovascular drugs, analgesia, NSAIDs and aspirin.	61% of medicines-related readmissions were judged to have been preventable. 59% of patients with a medicines-related readmission had more than one medication-related problem on the discharge summary from their index admission.
Zhang *et al.*, (2006)*	Routinely collected data. Australia.	To examine trends in ADRs causing readmissions.	37 296	Analysis of routinely collected data: ICD9/10 codes indicative of an ADR or an 'external cause' code.	WHO definition of ADR.	4.2 years.	18.4%	Cardiovascular drugs, antineoplastic drugs, corticosteroids, anticoagulants, NSAIDs and opioids.	Rates of ADR-related hospitalisations increases with age and is significantly higher for patients over 80 years compared to younger patients.
Zhang *et al.*, (2009)*	Routinely collected data. Australia.	To identify factors that predict readmissions due to ADRs.	28 548	Analysis of routinely collected data: ICD9/10 codes indicative of an ADR or an 'external cause' code.	Edwards and Aronson definition of ADR.	3 years.	17.7%	NSAIDs, anticoagulants and antineoplastic drugs.	Comorbidity was found to be a predictor for readmissions due to ADRs.

*Patients in these studies had already experienced an ADR-related hospital admission.

Table 3-4 shows that medicines are responsible for 4.2% to 38% (Dormann *et al.*, 2004; Witherington, Pirzada and Avery, 2008) of hospital readmissions but this was dependent of the study. The largest observational studies show a medication-related readmission rate of between 4.5% and 18.4% (Zhang *et al.*, 2006; Ruiz *et al.*, 2008). Many studies assessed a significant number of medication-related readmissions as preventable; range 22% to 87% (Rothwell *et al.*, 2011; Hauviller *et al.*, 2016). These percentages vary considerably due to differences in the populations being studied and the methods used to determine the number of medicines-related readmissions.

Many of the studies presented in Table 3-4 have also examined the medicines implicated in readmissions. Unsurprisingly, the medicines involved in readmissions are very similar to those involved in admissions; i.e. antiplatelets, anticoagulants, NSAIDs, cardiovascular medicines, and anti-epileptics (Davies *et al*., 2010; Forster *et al*., 2005; Moore *et al*., 2003; Ruiz, Garcia, Aguirre, & Aguirre, 2008).

3.4.6 Tools to identify patients at risk of medicines-related problems

The published evidence presented thus far demonstrates that strategies are required to try and reduce medicines-related admissions and readmissions. Certain patient groups or patients with particular co-morbidities have higher rates of readmission than others and several tools have been devised to try and predict the patients who are at highest risk of hospital readmission. These risk stratification strategies could allow targeted interventions to be implemented for certain patients with the aim of reducing the risk of emergency hospital readmissions. In the current financial climate, resources need to be targeted towards those that will gain most benefit; the tools that are described in the following section allow stratification and identification of those patients.

Tools to identify patients at risk of hospital readmission have been developed in other countries such as the LACE index in Canada which used length of stay, acuity of admission, co-morbidities and ED visits in the previous six months as indicators (Van Walraven *et al.*, 2010). When tested in a cohort of 507 older patients in England it was judged to be only 'fair' at predicting readmission or death (Cotter *et al.*, 2012). In another study conducted at a trust in central England (n=91,922), it performed no better than clinical judgement and only 25% of readmitted patients were those with the highest scores, indicating the highest risk of readmission (Damery and Combes, 2017).

Another, more complex tool, that has been validated in various non-UK populations is the HOSPITAL score which uses haemoglobin, contact with an oncology service, sodium level, procedure during hospital stay, acuity of index admission, number of hospital admissions in the previous year and length of stay as indicators (Donze *et al.*, 2016). This tool has not been validated in the UK population but when trialled on over 19,000 patients in Denmark it did not perform well and the research team acknowledged that complex elements including medical, social and environmental factors can also determine readmission (Cooksley *et al.*, 2016).

In England, the Nuffield Trust[1] have devised the PARR-30 tool which is designed to predict the risk of hospital readmission within 30 days of an initial discharge. The PARR-30 tool used a 10% sample of all NHS hospital admissions over a one year period to derive the factors that could predict hospital readmissions (Nuffield Trust, 2012). This tool calculated a risk of readmission by applying a coefficient to a score that included the following parameters: NHS organisation of admission, age, postcode (to determine deprivation level), number of emergency admissions in previous 30 days, acuity of admission and past medical history of certain conditions (Billings *et al.*, 2012).

The tools mentioned above are focussed on preventing readmissions due to all causes and not those specific to medicines. In some areas of England, efforts have been made to identify a wide variety of risk factors for a preventable medicines-related hospital readmission and to use these as indicators of patients that may require additional support when they transition from one setting to another. In London, the Integrated Medicines Management Service (IMM) have devised the PREVENT tool which includes the following parameters: physical impairment, frailty, adherence issues, cognitive impairment, new diagnosis or exacerbation of existing condition, medicines-related admission or risk from specific medicines and cultural and social factors (Barnett, Athwal and Rosenbloom, 2016). The PREVENT intervention involves medicines reconciliation, medicines optimisation, patient-centred consultations, enhanced communication between secondary and primary care, discharge planning, pre-discharge referral to primary care services and post-discharge telephone follow-up (Barnett *et al.*, 2017).

[1] The Nuffield Trust is an independent think tank which aims to improve the quality of healthcare in the UK by providing evidence-based research and policy analysis and informing and generating debate. www.nuffieldtrust.org.uk/about

Similar IMM schemes have been shown to be effective at reducing preventable medicines-related readmissions in Sweden (Hellström *et al.*, 2011), the prevalence of medication errors at discharge in Ireland (Grimes *et al.*, 2014) and the identification of medication discrepancies that would have resulted in long-term adverse effects in Norway (Nilsson *et al.*, 2015).

Between October 2008 and October 2014, 744 patients were assessed and supported by the team using the PREVENT tool in London. Of this cohort, 119 patients (16%) were readmitted within 30-days but only two (1.7%) of the 119 readmissions were deemed to have been preventable. In contrast, there were 17 readmissions (18.5%) in the control group of 92 patients and of these, four (23.5%) were preventable (Barnett *et al.*, 2016, 2017). Based on the published literature, the authors estimated that 18 (2.4%) to 74 (10%) of patients in the original cohort would have been expected to experience a preventable medicines-related hospital admission but in reality the number was much lower (Barnett *et al.*, 2017). Most pertinent for the health economy at the current time was the finding that for every £1 spent on pharmacist time, £3 was saved (Barnett *et al.*, 2016). A similar scheme in Northern Ireland estimated that £5 to £8 was saved for each £1 spent on such an intervention (Scott *et al.*, 2015). The use of tools such as PREVENT could be expanded into other geographical areas in England to determine whether they could successfully reduce medicines-related hospital readmissions there also.

Another tool that has been developed in England is the PINCER tool. This tool has been designed to identify patients in primary care who are prescribed medicines that are frequently connected with medication errors, a consequence of which could be a medicines-related hospital admission or readmission. The study involved a pharmacist-led intervention that utilised data on the GPs' computer system to identify patients at risk of specific medicines-related problems. The study population included over 480,000 patients. If patients fell into any of the chosen categories, the computer system would identify them, the pharmacist would educate the practice team about the problems and support them to resolve the issued identified. The results of the study showed that the intervention had a statistically significant effect on reducing the incidence of the prescribing problems that it intended to resolve (Avery *et al.*, 2012).

These studies have shown that there is some published evidence supporting the use of pharmacist follow-up of patients after a hospital admission to reduce the risk of a medicines-

related readmission. The next section will focus on the evidence base for medication review to reduce medicines-related admissions and readmissions to hospital.

3.4.7 The role of medication review and community pharmacists

Although some tools have shown promise, there have not been any large-scale trials to demonstrate they are generalisable to larger sections of the population. Medication review has been suggested as one way of reducing medicines-related admissions and readmissions. As previously mentioned, the term medication review encompasses a number of different processes provided by various HCPs, working in a variety of settings with access to varying amounts of information about the patient, their morbidities and medication. This current study focussed on medication review by community pharmacists in England.

Other authors have also highlighted the important role that community pharmacists can play in reducing medicines-related readmissions. Barnett and Blagburn, (2016) have highlighted five challenges that clinicians and managers in the NHS must overcome when trying to prevent medicines-related readmissions:

1. The complexity of ICD coding and HES data which are prone to human error.
2. Published evidence around medicines-related readmissions is mainly from North America rather than the UK.
3. Identification of patients at high risk of readmission is difficult and prediction models are not very sensitive or accurate.
4. There are a multitude of factors affecting medicines-related readmissions and those around the health beliefs of the patient may need to be addressed through behaviour change.
5. Financial pressures mean that high-resource interventions may be hard to justify.

They suggest four of ways of reducing medicines-related readmissions, all of which can be facilitated by community pharmacists alone or working in conjunction with other HCPs:

1. Medicines reconciliation on admission and discharge.
2. Person-centred patient education.
3. Shared decision-making.
4. Follow-up through community pharmacy.

(Barnett and Blagburn, 2016)

Specifically, the follow-up by patients in community pharmacy through the use of the NMS or PD-MURs would enshrine the role of the community pharmacist as fundamental to the smooth transition of care when patients are discharged from hospital.

The next part of the literature review is focussed on the evidence for medication review when conducted by community pharmacists and whether there is a mandate for this to become a compulsory part of post-discharge patient care.

3.5 Medication review

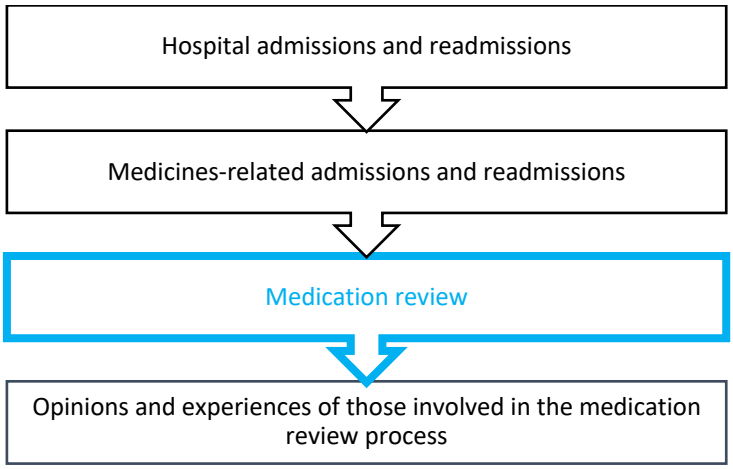


Figure 3-5 Literature review: Area Three – Medication review

It is well known that medicines-related problems occur after hospital discharge and they can be due to a number of factors, particularly poor communication during the transition period and patients who are not clear about the medicines they should take. In their Medicines Optimisation guideline NICE have stated that 30-70% of patients have an unintended change or error in their medicines when they move from one care setting to another (NICE, 2015c). Only 10% of patients are discharged from hospital taking the same medicines as on admission and changes to medicines are linked to increased mortality at three months post-discharge (Mansur, Weiss and Beloosesky, 2008). Over 60% of patients have three or more changes to their medicines whilst in hospital (Himmel *et al.*, 2004). A systematic review of 20 studies found that combining hospital discharge measures, such as discharge planning, with home follow-up was beneficial to reduce medicines-related problems in older people after discharge (Garcia-Caballos *et al.*, 2010).

3.5.1 Medication reviews

This section will focus on systematic reviews of medication review with the aim of providing an overview of the current published evidence. It focuses on services that are provided by community pharmacists but also includes some interventions delivered by other HCPs in various settings. When appraising the various systematic reviews, it became apparent that many of them included studies that were not specific to community pharmacists or the community pharmacy setting. There appeared to be a lot of studies but when the detail was inspected, they did not reflect the real-world situation and were either experimental or the

HCPs and settings were heterogenous. The combination of RCTs and non-RCTs in meta-analyses also confounded the analyses and conclusions that were drawn in some reviews.

3.5.1.1 Umbrella reviews and overviews of systematic reviews

Ryan *et al.*, (2014) updated a Cochrane overview of systematic reviews that was first published in 2011. They found 75 systematic reviews of interventions to improve the safe and effective use of medicines by consumers. The study populations, interventions and outcomes of the systematic reviews were diverse and were not limited to community pharmacy or pharmacists. The authors concluded that pharmacist-led interventions such as medicines reviews and pharmaceutical care showed positive effects on adherence, resolution of medicines-related problems, reduced prescribing of unnecessary medicines and increased patient knowledge about their medicines. More evidence was needed around how pharmacists could benefit patients under their care and there was a lack of evidence of benefit for interventions that targeted patients with multimorbidity who were subject to polypharmacy (Ryan *et al.*, 2014).

An umbrella review of community pharmacist interventions was published in 2013 by UK based authors (Mossialos, Naci and Courtin, 2013). The authors noted that numerous systematic reviews already existed which had attempted to summarise the evidence for various interventions, but whether the experimental studies contained in the systematic reviews were suitable for policy-making was not clear. The authors included 33 systematic reviews in their study. The inclusion criteria aimed to ensure that all the included systematic reviews focussed on community pharmacist interventions conducted in out-patient settings. The strongest themes to emerge were around the heterogeneity of the studies included in the systematic reviews: there were different HCPs delivering the interventions in the studies, interventions and outcomes were not well defined, they were conducted in various settings and RCTs and non-RCTs were combined for analyses. This made the interpretation of the results difficult. The authors also questioned whether RCTs were the best method to assess the effectiveness of interventions by community pharmacists due to the Hawthorne effect and they postulated that observational studies may be better suited to this area of research. The results of some of the included systematic reviews showed community pharmacists could benefit patients in terms of increasing the safe, effective and appropriate use of medicines but many were inconsistent or inconclusive. The authors concluded that there was insufficient evidence from their umbrella review to show the benefit of extending the role of community pharmacists. They questioned whether the current policies of expanding the community

pharmacists' role with increased funding were justified when the underpinning evidence was not conclusive (Mossialos, Naci and Courtin, 2013).

Since the start of the current study, an overview of systematic reviews that concerned specifically pharmacist-led medication reviews in community settings was published in 2017 (Jokanovic *et al.*, 2017). This comprehensive evaluation of 31 systematic reviews included 297 unique primary studies of pharmacist-led medication review. The authors concluded that pharmacist-led medication review had positive impacts on blood pressure, glycosylated haemoglobin (HbA1c), blood pressure and the number and appropriateness of medications (Jokanovic *et al.*, 2017). This overview appeared to provide a useful summary of the published systematic reviews on this topic but on further investigation there were some important differences between the included systematic reviews and the focus of this study.

The included systematic reviews used the Australian definition of 'Home Medicines Review', which is the equivalent of a clinical medication review in the UK (see section 2.1.1); this is a step-up from the MUR service provided by community pharmacists where the only information sources are the patient and details of their medicines (Blenkinsopp, Bond and Raynor, 2012). The inclusion criteria for the included systematic reviews meant that interventions had to involve pharmacists but ultimately, less than half of the included reviews were focussed only on pharmacist-led medication reviews. Likewise, only two reviews were solely located in community pharmacies, the remainder included patients' homes, outpatient and specialist clinics (Jokanovic *et al.*, 2017).

The authors did complete a very comprehensive and transparent quality assessment of the included reviews and ensured that only moderate and high-quality reviews were included, but it was noted that the systematic reviews included did themselves incorporate all study designs not just RCTs. Unsurprisingly, the systematic reviews with the highest quality ratings were Cochrane reviews (Jokanovic *et al.*, 2017). Meta-analyses of the systematic reviews were assessed particularly with regard to hospitalisations and mortality. Concerning hospitalisations and whether pharmacist-led medication review had any effect, the results were contradictory (Jokanovic *et al.*, 2017). It was noted that in one particular meta-analysis, RCT and non-RCT studies had been combined to suggest that clinical medication reviews significantly reduced hospitalisations. When the non-RCT studies were removed from the meta-analysis, the result was non-significant (Hatah *et al.*, 2014). This highlighted the difficulties faced when conducting

systematic reviews and meta-analyses of heterogenous primary studies. Regarding mortality, which two of the meta-analyses analysed, no significant effect was found for pharmacist-led medication review. The authors of the overview acknowledged that more RCTs were required to investigate whether pharmacist-led medication reviews have any effect on hospitalisations or mortality (Jokanovic *et al.*, 2017).

The Centre for Policy on Ageing, a charity established by the Nuffield Foundation (Centre for Policy on Ageing, 2018), published a rapid review of the effectiveness of community pharmacy MURs in 2014 that included an overview of systematic reviews. Their summary of evidence found that MURs reduced the risk of medicines-related problems and improved the appropriateness of medicines, but there was not definitive evidence that cost-effectiveness was improved. The effect of MURs on hospital admissions and mortality was also unproven (Centre for Policy on Ageing, 2014). The report based its conclusions on various published papers, although the search strategy was not included to allow an assessment of how thorough the literature review was. The reviews that were included did focus on practice in England and arguably provided a better summary of evidence of MURs compared to other international reviews such as that by Jokanovic *et al.*, (2017).

There was evidence that increased community pharmacist-GP collaboration was possible when they were co-located, and this had benefits for the patients in terms of implementation of the pharmacists' recommendations (Jokanovic *et al.*, 2017). This is a very complex area to explore and gain meaningful and explicit results due to the complex interplay between the settings of the interventions, how the invention was delivered, the context and priorities of the health system and the patient groups selected for study.

3.5.1.2 Systematic reviews of community pharmacist-led medication review

Table 3-5 provides an overview of the systematic reviews that have been published focussing on medication review provided by community pharmacists.

Table 3-5 Summary table of systematic reviews of pharmacist-led medication review

Author/year	**Number of studies included** **Latest year included in search strategy**	**Location of studies** **Number and age of patients included**	**Aim of study (A) and intervention (I)**	**Outcome measures** **Meta-analysis conducted?**	**Results**	**Comments**
Blenkinsopp and Hassey (2005)	7 studies of any design. 2003	Not reported.	A: To identify and assess the evidence for community pharmacy-based interventions in diabetes care. I: Community-based pharmacy services.	Diabetes control, adherence, medication problems, patient knowledge. No meta-analysis conducted.	There is some evidence that community pharmacy-based services improve diabetic control, increased adherence and patients are more likely to make lifestyle changes. Community pharmacists were positive about their extended role.	Only 2 studies included any form of medication review.
Cheema, Sutcliffe and Singer, (2014)	16 RCTs in systematic review, 11 RCTs in meta-analysis. November 2013	Australia 1 Canada 2 Portugal 1 Spain 2 Thailand 1 US 7 UK 2 3 032 in systematic review, 2 240 in meta-analysis. Adults >18 years.	A: To conduct a systematic review and meta-analysis of RCTs concerned with community pharmacist-led interventions on blood pressure (bp) control in hypertensive patients. I: Community pharmacist-led interventions for bp control (patient education on hypertension and lifestyle, management of prescribing and safety of medicines).	Reductions in systolic and diastolic blood pressures measured in the community pharmacy or at home. Meta-analysis conducted.	Statistically significant reductions in systolic and diastolic bp, $p<0.00001$.	Intervention conducted only by community pharmacists.

Fish, Watson and Bond, (2002)	16 RCTs; 8 were of medication review or patient-specific prescribing advice in a variety of settings e.g. clinics, GP surgeries. March 2001.	Australia 2 Canada 1 Sweden 1 UK 5 US 7 Number and ages of patients not stated.	A: To conduct a systematic review of the effectiveness of practice-based pharmaceutical interventions. I: Practice-based pharmaceutical interventions conducted by pharmacists.	Efficacy and cost. No meta-analysis conducted.	7/8 RCTs of medication review or patient-specific prescribing advice showed statistically significant results (e.g. reductions in bp, cholesterol, drug-related problems) and 1/8 presented cost-effectiveness data with no significant effect of intervention on cost-effectiveness.	Included studies were heterogenous and therefore difficult to summarise. Hard to generalise results as often RCTs involved a single pharmacist/setting.
Geurts *et al.*, (2012)	83 papers describing 77 studies. All study types included. June 2011	Australia/New Zealand 18 Europe 40 US/Canada 19 Number and ages of patients not specified for all studies.	A: To systematically review the literature on the impact of pharmacist and GP collaboration and the outcome on their patients' health. I: Collaboration between pharmacists and GPs. Various different interventions included.	Various different outcome measures included. No meta-analysis conducted.	9/77 studies focussed on hospitalisations as main outcome measure but conflicting results as to whether medication review had any significant effect. Cooperation between patients and HCPs resulted in increased identification and resolution of medicines-related problems.	Medication reviews were conducted in various settings including the community pharmacy, the GP surgery or the patient's home. Many of the studies were not able to recruit the number of patients they had intended to ensure the studies had sufficient power. None of the included studies from the UK were conducted on the community pharmacy MUR service, the majority of UK studies were conducted before the introduction of MURs.

Hatah *et al.*, (2013)	21 of 36 studies of the primary outcome measures. RCTs, before/after studies, prospective and retrospective cohort studies in a variety of settings. February 2011	Australia 2 Belgium 1 Canada 3 Denmark 1 Netherlands 2 UK 4 US 8 Numbers varied depending on outcome measure. Ages of patients not stated.	A: To examine the impact of fee-for-service pharmacist-led medication review, of various types, on patient outcomes. I: Medication-review service provided by pharmacists involving pharmaceutical care. 9/21 studies were conducted in community pharmacies. 5/21 studies used adherence reviews i.e. MUR type reviews.	Mortality, hospitalisation, clinical outcome measures or markers of disease progression. Meta-analysis conducted.	Pharmacist-led medication review significantly reduced bp (OR 3.50, 95% CI 1.58-7.75, p=0.002) and low-density lipoprotein (OR 2.35, 95% CI 1.17-4.72, p=0.02). There was no significant effect on hospitalisations (OR 0.69, 95% CI 0.39-1.21, p=0.19) or mortality (OR 1.50, 95% CI 0.65-3.46, p=0.34). When sub-groups were analysed, clinical medication review reduced hospitalisations (OR 0.46, 95% CI 0.26-0.83, p=0.01) but not adherence support reviews did not (OR 0.88, 95% CI 0.59-1.32, p=0.54).	When the non-RCT studies of clinical medication review were removed from the meta-analysis there was no significant effect on hospitalisations. This study did conclude that both clinical and adherence reviews increased patients' adherence to their medication. Pharmacists were remunerated for the services provided as per the MUR service in England.
Holland *et al.*, (2008)	32 RCTs conducted in any setting. 17 RCTs in meta-analysis. September 2005	Australia 4 Canada 3 Europe 1 Singapore 1 UK 13 US 10 >9 900 patients in meta-analysis. Patients >60 years old.	A: To evaluate and quantify the effects of medication review by pharmacists on clinical outcomes. I: Pharmacist-led medication review.	Emergency hospital admissions and mortality. Meta-analysis conducted.	Hospital admissions; relative risk (RR) 0.99 (CI 0.87-1.14), p=0.92. Mortality RR 0.96 (CI 0.82-1.13), p=0.62. Number of drugs prescribed was slightly reduced. Some increases in patient knowledge and adherence to medicines but no effect on quality of life (QoL).	Only 3 included studies were conducted in community pharmacies.

Nkansah *et al.*, (2010)	43 RCTs; 36/43 pharmacist interventions targeting patients, 7/43 pharmacist interventions targeting health professionals. March 2008	No location summary included in paper. Various numbers of participants dependent on outcomes being measured. Ages of patients not stated.	A: To examine the effect of pharmacists non-dispensing roles on patients' and health professionals' outcomes. I: Studies included focused on: 1. Pharmacist services for patients versus services delivered by other health professionals. 2. Pharmacist services targeted at patients versus no service. 3. Pharmacist services targeted at health professionals versus the delivery of no comparable service.	Various different outcomes included. No meta-analysis conducted.	1. 1 study – significant improvement in bp for patients cared for by pharmacist compared to doctor. 2. 5 studies – pharmacists reduced therapeutic duplication and reduced the number of medicines prescribed. Pharmacists were able to have statistically significant effects by reducing systolic and diastolic bp and HbA1c. 3. 2 studies showed statistically significant improvements in prescribing patterns.	Pharmacists were in out-patient settings which could include out-patient clinics at hospitals.
Royal *et al.*, (2006)	38 studies in systematic review. All study types included. 17/38 were pharmacist-led interventions and of these 13/38 were included in meta-analysis. February 2005 for main biomedical databases, 2001 for others.	Australia 3 Europe 16 New Zealand 1 US 18 Various numbers and ages of participants.	A: To identify and evaluate interventions in primary care aimed at reducing medication-related adverse events that result in morbidity, hospital admissions or mortality. I: Interventions in primary care aimed at reducing medication-related adverse events.	Drug-related morbidity, hospitalisation and death. 15/38 studies reported hospital admission as an outcome. Meta-analysis conducted.	Pharmacist-led medication review significantly reduced hospitalisations (OR 0.64, 95% CI 0.43-0.96) but restricting the analysis to RCTs only showed no significant effect on hospitalisations (OR 0.92, 95% CI 0.81-1.05). No evidence of benefit of interventions conducted by other HCPs in primary care.	Lack of high-quality studies of effect of medication reviews on hard outcomes.

Thomas *et al.*, (2014)	20 RCTs in systematic review. 9 RCTs of community pharmacist interventions and also meta-analysis. June 2010	Australia 2 Canada 1 Europe 5 US 3 UK 9 2 774 in hospital intervention studies. 6 618 in community pharmacist intervention studies. Adults >60 years.	A: To evaluate the effectiveness of interventions led by hospital or community pharmacists to reduce unplanned hospital admissions in older people. I: 3/9 trials of intervention in community pharmacies. 5/9 trials were of community pharmacists conducting home medication review (HMR) with access to medical notes. 1/9 trials of medication assessment in GP surgery.	Unplanned hospital admissions. Meta-analysis conducted.	No reduction in unplanned hospital admissions, relative risk (RR) 1.08 (95% CI 0.96-1.21). No effect when trials were analysed for admissions at 3, 6 or 12 months.	Interventions by hospital pharmacists also did not have any effect on hospital admissions, RR 0.97 (95%CI 0.88-1.07).
Viswanathan *et al.*, (2015)	44 studies of various types: RCTs 21 Non-randomised clinical trials 4 Cohort studies 19 January 2014	Non-US 9 US 35 Combination 1 (paper does not say why this is greater than 44). Individual studies included between 10 and 200 722 patients. Adults >18 years.	A: To assess the effect of medication management therapy interventions among outpatients with chronic illnesses. I: Medication therapy management: comprehensive medication review, patient directed education, care co-ordination and opportunity of follow-up; delivered by a pharmacist.	Medication-related problems, morbidity, mortality, quality of life, health care use, costs, and harms Meta-analysis conducted.	No effect on overall hospitalisations (p=0.412) but reduced hospitalisations for patients with diabetes OR 0.91-0.93 and heart failure OR 0.55 (95% CI 0.39-0.77). No difference in the number of outpatient visits (p=0.247). Improved medication appropriateness (p<0.001), adherence and reducing dosing.	Only 16 studies described interventions conducted in a community pharmacy and only 22 studies described face-to-face interventions. No evidence that medication therapy management improved outcomes globally regardless of study design.

These systematic reviews have highlighted the large number of variables that exist when conducting research in this area that give a high level of heterogeneity and mean there are inherent difficulties comparing and interpreting the findings of the various reviews. The variables are listed below:

- ***Types of study*** - different types of study have been included in the reviews i.e. RCTs, cohort studies, etc. There has been some debate about whether this is appropriate, one published paper has suggested that the advantages of combining different types of study in a systematic review outweigh the disadvantages although combining outcome data in a meta-analysis was more complex (Shrier *et al.*, 2007).
- ***HCPs conducting medication reviews*** – different HCPs delivered the medication reviews e.g. GPs, community pharmacists.
- ***Settings*** - medication reviews were conducted in various settings e.g. patients' homes, GP surgeries, pharmacies, nursing or care homes, hospitals.
- ***Study population*** - some of the primary studies were conducted in specific populations e.g. those with specific conditions or over a certain age.
- ***Level of medication review*** - different levels of medication review have been conducted in the studies and it was not always clear from the systematic reviews which level had been included.
- ***Experimental or 'real-world' settings*** - primary studies have been conducted in experimental and 'real life' situations and combining them could be challenging.
- ***Remuneration*** – following on from the above point, medication review in the real world is remunerated in several countries and it is not always clear whether the studies of medication review fell into this category.
- ***Country of study*** – various healthcare systems exist in the countries of study so comparing interventions could prove troublesome.
- ***Outcome measures*** – various measures have been used to determine the effectiveness of medication review e.g. 'softer' outcomes such as adherence and patient knowledge, 'medium' outcomes such as blood pressure, cholesterol, blood sugar control and 'hard' outcomes such as hospital admissions or mortality.
- ***Study quality*** – the studies included in the reviews were of variable quality and consequently the risk of bias varied.

The systematic reviews included in Table 3-5 did not find any definitive effect of medication review for the general population on hospital admissions. In smaller cohorts of patients with

specific conditions, such as diabetes or heart failure (Viswanathan *et al.*, 2015), or for more intensive variants of medication review (Hatah *et al.*, 2013) there appears to be some evidence that medication review has a beneficial effect on these outcomes.

A very recent systematic review and meta-analysis by Huiskes *et al.*, (2017) was not eligible for inclusion in Table 3-5 as it focussed on medication review in the normal clinical practice and did not restrict studies according to the HCP conducting the review or the setting. The authors included 31 RCTs in their best evidence synthesis and conducted various meta-analyses. It warrants inclusion here as the authors conducted a meta-analysis that focused on the 'hard' outcomes of mortality and hospital admissions. Meta-analysis of 11 studies showed that medication review had no effect on mortality, RR 0.94 (95% CI 0.76-1.17) and meta-analysis of five studies, that included over 2000 patients, found no effect on hospital admissions, RR 0.94 (95% CI 0.81-1.08). The only statistically significant result was a reduction in the risk of falls, RR 0.68 (95% CI 0.52-0.90) (Huiskes *et al.*, 2017).

At the current time, it appears that there are no published systematic reviews that investigate solely community pharmacist delivered, remunerated medication reviews, conducted in a community pharmacy, and focussed on hard outcomes such as hospital admissions or mortality. Some authors have suggested a large-scale RCT to determine whether remunerated community pharmacist MURs have any effect on hospital admissions or mortality (Holland *et al.*, 2008; Geurts *et al.*, 2012) and if studies such as these were conducted a systematic review would be possible.

In 2016, the Chief Pharmaceutical Officer (CPO) for England commissioned an independent review of community pharmacy clinical services which was conducted by Richard Murray (Murray, 2016). This was not a systematic review but aimed to provide an overview of the evidence-base. This was deemed necessary because of the opportunities for new models of working in community pharmacy based on the proposals in the Five Year Forward View published by NHS England in 2014 (NHS England, 2014) and the General Practice Forward View in 2016 (NHS England, 2016a). These two reports highlighted, amongst other things:

1. the greater potential input of pharmacists to urgent and emergency care.
2. the roll-out of clinical pharmacists working in GP practices.

As part of the CPO's independent review, a rapid review of the evidence around clinical services commissioned from community pharmacies was compiled (Wright, 2016). This rapid review searched for 'primarily systematic reviews' that provided evidence for the effectiveness or otherwise of various clinical services including MURs. Ultimately, very few studies were included in the rapid review and those that did, concentrated on the patient's perspective and included both MURs and MUR-like services. The review found that there were no RCTs that evaluated the effectiveness of MURs from the patient's perspective; although at the time of the report a study was underway in Italy (Wright, 2016). Since the rapid review was written, the results of the Italian RCT have been published. Even though the study only recruited 816 of the 1800 intended patients, they found that MURs conducted by community pharmacists for patients with asthma significantly improved their asthma control, as measured using the self-completed Asthma Control Test scoring system with an OR of 1.76 (95% CI 1.33-2.33) and a number needed to treat (NNT) of 10 (95% CI 6-28). They also significantly reduced the number of active ingredients prescribed, increased adherence and were cost-effective (Manfrin *et al.*, 2017).

Based on the rapid review written by David Wright (Wright, 2016), the Murray report (Murray, 2016) recommended that the MUR service should be redesigned with a MUR as a full clinical medication review, with an independent prescriber, who has full access to the patient's medical record at the time of the review. In the meantime, MURs should be enhanced to include follow-up and monitoring of the patient with a focus on optimising medication and providing information for those with long-term conditions to enable them to stay well (Murray, 2016).

Professor Wright also explained in a commentary piece how he thought the MUR service should be changed. He felt that the service had problems that had not been resolved since its inception. One of the main issues was that the service is based on remuneration, which drives service provision rather than focussing on the quality or outcomes of the service; in his opinion this is not how healthcare should be commissioned. He believes that the MUR service should be redesigned so that GPs refer patients to community pharmacists and the MUR process would include a review of treatment, support adherence, and include follow-up to monitor patients' progress. This service would require closer pharmacist-GP collaboration and community pharmacists would be able to support fewer patients due to their increased involvement. He suggested that payment should be outcome based e.g. if a patient on

antihypertensives reached their blood pressure target. This refreshed approach to MURs would require excellent communication and engagement between the GPs and pharmacists and pharmacist access to the patient's medical records (Wright, 2017).

The systematic reviews discussed thus far included studies that were heterogenous and it was therefore challenging to combine them to make meaningful judgements about the outcomes related to community pharmacist medication review. The following section focuses on individual studies where medication review has been investigated.

3.5.1.3 Community pharmacist-led interventions and the effect on hospital admissions

The following published studies, detailed in Table 3-6, were all conducted to discover whether community pharmacy interventions, specifically medication review, had any effect on hospital admissions.

Table 3-6 Individual studies investigating medication review with hospital admissions as primary/secondary outcomes

Author, (year)	Study population	Aim of study	Method	Intervention	Results	Comments (Limitations/gaps)
Farris *et al.*, (2004)	199 patients recruited 182 had medication histories completed by a pharmacist and presented to the primary healthcare team. Patients taking ≥ 3 medicines per day, at least one poorly controlled chronic disease/untreated disease, medicines changed more than 4 times in last year, drug-related problem, history of non-compliance or recent decline in health.	To implement collaborative, community-based care among providers not located in the same clinic. The aim was to improve or maintain the health status of high- risk community-dwelling patients, with a focus on improving medication use.	Single group pre and post design, without control.	HMR by community pharmacist with follow-up and resolution of issues by team. Primary healthcare team set up, consisting of family doctor, nurse (some teams did not have a nurse), pharmacist and home care manager who was also a nurse. Weekly meetings held to discuss patient care and medication issues and how issues could be resolved.	Of 182 patients and 151 team discussions, an average of 3.9 medication issues per patient were identified. Compliance was improved at 3 months ($p<0.001$) and 6 months ($p=0.2$). Non-significant trend towards fewer ED visits, hospital admissions and GP visits.	Authors concluded that 'policy initiatives that should be considered include the development of a larger, randomized controlled study to compare patients in several communities.' Patients reported improved medication adherence but could be biased as patient reported. Too few patients were studied for statistical significance and there was no control group.
Graffen, Kennedy and Simpson, (2004)	402 patients >65 years, living independently, taking ≥ 5 medications per day and one other risk factor from list in paper. 202 patients in intervention group in Australia.	To determine whether medication review affects QoL and assess whether there is any effect on medication-related hospital admissions.	Two group pre and post intervention randomised trial.	Pharmacist reviewed medication of eligible patients and then presented each case to the GP during a case conference. The GP then followed up the patient.	No significant difference in medication-related hospital admissions between control and intervention groups. Only significant difference between groups was improved vitality ($p<0.009$) and mental health ($p<0.0001$) in intervention group. The authors acknowledge this could be due to increased medical attention due to participation in the study.	Pharmacists identified 687 medication issues for GPs to review but only 243 actual changes were made to prescriptions. No mention was made in the paper about the disparity between the two figures.

Krska *et al.*, (2001)	Patients recruited from GP practices in Scotland; 381 patients in total (168 in intervention group and 164 in control group). Patients were > 65 years and taking ≥ 4 medicines.	To study the effect of pharmacist-led medication review on the resolution of pharmaceutical care issues, medicine costs, use of health and social services and health-related quality of life.	RCT.	Pharmacist reviewed medicines then prepared a pharmaceutical care plan which included assessment of medicines, extraction of information from medical records and patient interview. Control group patients only had a pharmacist review of medicines but no care plan.	1380 pharmaceutical care issues identified in the intervention group compared with 1206 in control group. At 3 months, 70% pharmaceutical care issues had been resolved in intervention group compared to 14% in control group; this was statistically significant (no p value stated). Slightly fewer hospital admissions in intervention group, but numbers were too small to determine significance.	The most common medications associated with pharmaceutical care issues were: diuretics, nitrates, calcium channel blockers, potassium channel activators, ACE inhibitors and antihypertensives.
Leendertse *et al.*, (2013)	364 intervention patients and 310 control patients in the Netherlands who were over 65 years, taking ≥ 5 medicines, with indicators of non-compliance and taking medicines acting on the gastrointestinal tract or for the blood.	To investigate the effect of a multicomponent pharmaceutical care intervention on medication-related hospitalisations, survival, ADEs and QoL.	Open, controlled multi-centre study.	Pharmaceutical care provided by usual pharmacist and GP. Patients had an initial interview with the pharmacist to identify any drug-related issues and a pharmaceutical care plan was implemented after discussion with the GP. Patients followed up by the pharmacist at least twice more during the study.	Hospital admissions; 6 in intervention group and 10 in control group but difference not statistically significant, hazard ratio (HR) 0.5 (95% CI 0.12-1.59). Only statistically significant for patients with ≥ 5 co-morbid conditions, HR 0.28 (95% CI 0.056-0.73).	Pharmacists conducting medication reviews had access to patients' medical records. Study was massively underpowered as aimed to recruit 14200 patients. Conclusions suggest larger study required.

Lenaghan, Holland and Brooks, (2007)	136 patients from 1 GP practice living in the east of England who were over 80 years old, living at home and taking ≥ 4 medicines per day with at least one medication 'risk factor'. 69 patients in the intervention group and 67 in the control group.	To assess whether home-based medication review by a pharmacist for at-risk older patients in a primary care setting could reduce hospital admissions.	RCT.	Home-based medication review by pharmacist.	No statistically significant difference in hospital admissions between intervention and control groups at 6 months (20 admissions v. 21 admissions), RR 0.92 (95% CI 0.50-1.70), p=0.80, or care home admissions (p=0.3), death (p=0.81) or QoL (p=0.10). Statistically significant reduction in the number of medicines prescribed in the intervention group, 0.87 medicines fewer (95% CI -1.66 to -0.08), p=0.03. Attributed to face-to-face contact between pharmacist and GP after MUR.	Suggested further studies should investigate cost-effectiveness of intervention as no clear health gain but signs of reduction in prescribing costs. The intervention cost £12 per patient and was conducted by one pharmacist so generalisability could be an issue but as the intervention focussed on a high-risk population it could be cost-effective if scaled up to a population level.
Malet-Larrea *et al.*, (2016)	178 community pharmacies in Spain. 688 patients in intervention group and 715 in control group. Expert panel of 3 doctors determined whether hospital admissions were medicines-related.	To assess the impact of a medication review with follow-up service provided in community pharmacy to aged polypharmacy patients on the number of medication-related hospital admissions and to estimate the effect on hospital costs.	Sub-group analysis of cluster RCT.	Comprehensive medication review over a 6-month period.	The OR of hospital admission was significantly higher in the control group; OR 2.7 (95% CI 1.1-6.7, p=0.036). Mean cost per medicines-related hospital admission was €6672. Cost per medicines-related admission was significantly higher in the control group; €301 v. €94 in intervention group (95% CI 35.9 -378.0), p=0.018.	Community pharmacists providing the service attended a 3-day training course prior to the study. There was no mention of remuneration in paper.

Ocampo *et al.*, (2015)	132 patients taking at least one medicine in Spain.	To evaluate the clinical, economic, and humanistic impact of a pharmacist-conducted medication review.	An 'effectiveness-implementation hybrid design' to assesses the effectiveness of an intervention and implementation strategy.	Patients took their medical records when they saw the pharmacist each month, for 18 months. The pharmacist then identified medication-related issues and complied an action plan for the patient and liaised with other HCPs as appropriate; known as medication review with follow-up.	Patients who participated in the intervention experienced a significant decrease in the number of medicines used, from 6.1 to 3.3, a significant decrease in hospitalisations, OR 0.31 (95% CI 0.10-0.99), p=0.039 and in ED visits, OR 0.16 (95% CI 0.05-0.55), p=0.001.	Focus of medication review with follow-up is on outcomes rather than the medication-use process.
Roughead *et al.*, (2009)	273 veterans over 65 years old, taking specific beta-blockers for heart failure received the intervention and were compared with 5444 controls in Australia.	To examine the effect of HMR on time to next hospitalisation for veterans with heart failure.	Retrospective cohort study.	Pharmacist home medication review in collaboration with GPs (now a standard pharmacy service in Australia).	For veterans who had a HMR there was a 5.5% hospital admission rate compared to 12% in the control group, this equated to a 45% reduction in rate of hospitalisations and was statistically significant, HR 0.55 (95% CI 0.39-0.77), p=0.0007.	Study highlights effectiveness of HMR in Australia in contrast to MURs in UK. Veterans were chosen as in Australia there is a database of all prescriptions, hospital admissions, etc for this group.
Roughead *et al.*, (2011)	Veterans and war widows in Australia. Patients aged > 65 years, had ≥ 2 warfarin prescriptions dispensed in last 6 months, received fully funded healthcare and had had a HMR. 816 patients in intervention group and 16, 320 in control group.	To determine the impact of a general practitioner-pharmacist-collaborative medication review on hospitalisations for bleeding in patients taking warfarin.	Retrospective cohort study.	Intervention group = HMR (patients referred by GP, pharmacist carried out review in patient's home, GP follows up any issues highlighted by review). Control group = Patient who had not had a HMR.	Statistically significant, 79% reduction in likelihood of hospital admission for warfarin-related bleeding in 2-6 months following HMR, HR 0.21 (95% CI 0.05-0.87) but effect not sustained for > 6 months. There was also an increased likelihood of hospital admission for warfarin related bleeding for patients in the intervention group more than 12 months after the HMR.	Study of patients in usual setting. Intervention group patients more unwell at baseline so may explain why increased admission rate after > 1 year. No limitations detailed in the study but assessed as high quality based on CASP criteria. Recommend 6 monthly HMR for patients taking warfarin.

Sellors *et al.*, (2003)	889 patients over 65 years of age taking ≥ 5 medications in Ontario, Canada. 431 patients in the intervention group and 458 patients in the control group.	To examine whether an intervention by a specially trained pharmacist could reduce the number of daily medication units taken by elderly patients, costs and health care use (which included hospital admissions.	Cluster RCT.	Pharmacists met with patients in the doctor's surgery for a medication review. The pharmacist gave written recommendations to the GP with the aim of resolving any drug-related problems.	There were no significant differences between the intervention and control group in terms of the number of medications taken (p=0.87), health-related QoL (p=0.35) or medicines-related hospital admissions (p=0.08).	GPs resolved 72% of drug-related problems that were highlighted by pharmacist review. The authors conclude that this shows promising collaboration is possible between GPs and pharmacists.
Sorensen *et al.*, (2004)	GPs in Australia recruited 400 patients (177 in intervention group and 233 in control group).	To examine the effectiveness of a multidisciplinary service model delivering medication review to patients at risk of medication misadventure in the community.	RCT.	GP referred eligible patients for home-based medication review. Pharmacists conducted the review, wrote the report and the GP followed up the patient.	No statistically significant effect on cost, quality of life (p=0.17), hospital admissions (no p value stated) or GP appointments (no p value stated). Pharmacists' recommendations were mainly around ADRs, monitoring, adherence and concordance. Only 54% of interventions were acted on and 70% had a positive outcome.	Aimed to reflect 'real world' practice and produce more generalisable results; since this study was published Australia has implemented this system.

Zermansky *et al.*, (2001)	1188 patients recruited from 3 GP surgeries in the UK; 560 patients received intervention in north UK. Patients were > 65 years taking ≥ 1 repeat medicine.	To determine whether a pharmacist can effectively review repeat prescriptions through consultations with elderly patient in general practice.	RCT.	Pharmacist medication review (which was more in-depth than a standard MUR) in a pharmacist clinic.	No difference between intervention and control groups in terms of the number of daily doses (p=0.17), number of GP appointments (p=0.69), outpatient appointments (p=0.41) and hospital admissions (p=0.16). 19 intervention group patients and 17 control group patients were admitted to hospital (p=0.16). Trend of increased cost and number of prescriptions in both groups, but significantly less in the intervention group. Pharmacist medication review was cost effective even when the cost of the intervention was deducted.	Results of this RCT may not be generalisable as only one pharmacist and four GPs participated, but this study provides some useful evidence of the effectiveness of medication review. Pharmacists were located in a GP practice for this study. High quality study according to CASP criteria but not easy to extrapolate the results as only 1 pharmacist and 4 GP practices involved.

Table 3-6 shows that only four studies (Roughead *et al.*, 2009, 2011; Ocampo *et al.*, 2015; Malet-Larrea *et al.*, 2016) showed statistically significant reductions in hospital admissions as a result of medication review. In both studies by Roughead *et al.* (2009, 2011) specific populations were targeted; those taking beta-blockers for heart failure and those taking warfarin. The study by Ocampo *et al.* (2015) involved a very intense intervention whereby patients saw the pharmacist every month for 18 months which is very different to the English MUR service. The study by Malet-Larrea *et al.*, (2016) included patients over 65 years old taking ≥5 medicines and was therefore more representative of the general population.

Nearly half of the studies presented in Table 3-6 described HMR, where the pharmacist delivered the medication review in the patient's home. This is clearly not the same as the MURs that are offered by English community pharmacists. It is therefore unclear whether the location of the medication review had an impact on the results of the studies. It is worth noting that HMR is now a standard community pharmacy service in Australia, with GPs referring patients in the community for a HMR with their community pharmacist (Pharmaceutical Society of Australia, 2011).

There are certainly difficulties determining the effect of medication review in preventing hospital admissions. An observational study of 14 community pharmacies involved pharmacists recording details of clinical interventions for one week each month, for a period of a year. The results showed a 0.75% intervention rate. The interventions were then assessed by a clinical panel who deemed 19 to 242 (0.01 - 0.12%) of the interventions to have prevented a medicines-related hospital admission. The paper did not state the locations of the pharmacies, who sat on the expert panel and gave no examples of the interventions. This made it hard to assess the accuracy of the figures (Hawksworth *et al.*, 1999). The results of this study have been used by other studies, such as Sorensen *et al.*, (2004), to definitively state that community pharmacists reduce drug-related hospital admissions.

There are also difficulties with GPs actioning the recommendations made by community pharmacists during the MUR process. A small-scale study conducted in a discreet region of the UK examined patients with coronary heart disease who had participated in a MUR. They compared 294 intervention group patients with 360 patients in a control group and reviewed changes in prescribed medicines 3 months after the MUR. They found that 56.3% of

interventions were acted on by GPs and intervention group patients had more changes to their prescribed medicines compared to control group patients (Wilcock and Harding, 2008).

These studies focussed only on medication reviews that occurred for patients in community settings. The next section summarises studies that included patients who had recently been discharged from hospital.

3.5.1.4 Studies of the effects of post-discharge medication reviews on hospital readmissions

Studies that have investigated the effect of post-discharge medication reviews on hospital readmissions are shown in Table 3-7. Often these interventions were conducted during or immediately after a hospital admission and where indicated, some were implemented by a hospital pharmacist.

Table 3-7 Individual studies investigating post-discharge medication review with hospital admissions as primary/secondary outcomes

Author, (year)	Study population	Aim of study and intervention	Method	Results	Comments (Limitations/gaps)
Gillespie *et al.*, (2009)	182 intervention patients and 186 control group patients over 80 years old from a University hospital in Sweden.	To investigate the effectiveness of interventions performed by ward-based pharmacists in reducing morbidity and use of hospital care among older patients. Enhanced hospital pharmacist service which included: drug history on admission, medication review, patient education and monitoring, communication with primary care and follow-up telephone call at 2 months post-discharge.	RCT.	Statistically significant reduction in drug-related readmissions (reduced by 80%) and ED visits (reduced by 47%) in intervention group up to 12 months after discharge. 9 drug-related readmissions (of which 4 were avoidable as the pharmacist had recommended a change to therapy that had not been actioned) in intervention group compared to 45 in control group. Intervention group patients cost $230 less than control group patients.	A study showing the statistically important benefit of pharmacist involvement in secondary care to prevent readmissions.
Hellström *et al.*, (2011)	210 patients, ≥65 years who were admitted to internal medicine wards at a University Hospital in Sweden.	To examine the impact of a medication review while in hospital on the number of inappropriate medications and unscheduled drug-related hospital revisits in elderly patients. Intervention group received IMM model of care which included medicines reconciliation on admission and discharge, medication review and monitoring. Control group had standard care.	Prospective controlled study.	Statistically significant reduction in drug-related readmissions: 6 readmissions in intervention group, 12 readmissions in control group (p=0.0469).	Greater decrease in number of inappropriate medicines in intervention group compared to control group (p=0.0446). More intensive intervention than English MUR system.

Holland *et al.*, (2007)	3 district general hospitals in UK. Adults > 18 yrs, emergency admission with heart failure and discharged taking ≥ 2 drugs. 17 study pharmacists. 149 patients in intervention group. 144 patients in control group.	To test whether a drug review and symptom self-management and lifestyle advice intervention by community pharmacists could reduce hospital admissions or mortality in heart failure patients. Intervention group = Community pharmacists received a copy of the patient's discharge letter and conducted a home medication review within 2 weeks and 8 weeks of discharge. Control group = standard care.	RCT	112 emergency readmissions in control group and 134 in intervention group within 6-months of discharge, (p=0.28); not a statistically significant result. Full mediation review evaluating efficacy of each drug and the patient's condition i.e. more detailed than a MUR. Statistically significant increase in contact between patients and primary care (p=0.002) and increased number of items prescribed (p<0.001). There was no effect on mortality or quality of life.	Emergency admission data from HES. Heart failure nurse specialist interventions have shown reductions in readmissions. High quality study according to CASP criteria for RCTs.
Holland *et al.*, (2005)	872 patients aged > 80 years, discharged from hospital to their own home, taking ≥ 2 prescribed medicines.	To determine whether home based medication review by pharmacists affects hospital readmission rates among older people. Home based medication review by community pharmacist at 2- and 8-weeks post-discharge.	RCT.	Intervention group patients had statistically higher rates of hospital readmission compared to the control group, 234 v. 174, rate ratio 1.30, (95% CI 1.07-1.58), p = 0.009. Intervention group patients also had more GP visits (p=0.002) and poorer quality of life (p=0.042). No significant differences in care home admissions or death between the groups.	Authors suggest that home-based medication review may increase patients' knowledge of their condition and medication so patients spot warning signs and seek help. Increased adherence to medication increased iatrogenic disease. Home-based medication review caused increased anxiety about condition and resulted in hospital readmission. High quality study according to CASP criteria.

Luder *et al.*, (2015)	90 patients, >18 years discharged from two US hospitals with a diagnosis of congestive heart failure, chronic obstructive pulmonary disease, or pneumonia.	To determine if a community pharmacy transition of care program that included medication review amongst other activities decreased hospital admissions. Pharmacists reconciled the patients' medications, identified drug therapy problems, recommended changes to therapy and provided self-management education. Intervention occurred within 7 days of discharge.	Prospective quasi-experimental study.	Pharmacist intervention significantly reduced hospital readmissions within 30 days, OR 0.072 (95% CI 0.008-0.628), p=0.017.	No difference in patient satisfaction between the control and intervention groups.
Naunton and Peterson, (2003)	Australian study of 121 patients; 57 in intervention group and 64 in control group at high risk of hospital readmission (over 60 years, with at least 2 chronic conditions and taking 4 or more medicines).	To evaluate pharmacist-conducted follow-up at home of high-risk elderly patients discharged from hospital. HMR review for intervention patients at 5 days post-discharge and for both groups at 90 days post-discharge.	RCT.	Statistically significant differences in intervention and control groups for unplanned readmissions (28% intervention groups patients v. 45% control group patients readmitted, p=0.05), patients with > 1 DRP, DRP per patient and patients taking a NSAID. Patients were positive about the medication review and 79% of the pharmacists' suggestions were implemented by the GPs.	
Nazareth *et al.*, (2001)	362 patients evenly distributed to intervention and control groups. Patients were over 75 years old, taking ≥ 4 medications and had been recently discharged from hospital in London, UK.	To investigate the effectiveness of a pharmacy discharge plan in elderly hospitalized patients. Hospital pharmacists prepared a medication discharge plan that was given to the patient and the community pharmacist. Home-based medication review by community pharmacists 7-14 days after hospital discharge.	RCT.	There were no differences between the groups in readmissions at 3 or 6 months. The only statistically significant difference between the groups was in patient knowledge. No p-values stated.	Pharmacists spent 5.5 hours on the discharge plan. Only 71% (132) of eligible patients actually received the intervention despite a power calculation of 195 patients required per arm.

Schnipper, Kirwin, Cotugno, Wahlstrom, Brown, Tarvin, Kachalia, Horng, Roy, *et al.*, (2006)	178 patients discharged from a teaching hospital in US. 79 patients analysed in intervention group and 73 in control group.	To identify drug-related problems during and after hospitalization and to determine the effect of patient counselling and follow-up by pharmacists on preventable ADEs Intervention group patients had a pharmacist resolve any medication discrepancies prior to discharge and medication counselling and resolution of issues.	RCT.	For preventable ADEs; 1% intervention group and 11% control group had an ADE (p=0.01). Rate of preventable ED visits/readmissions was 1% in intervention group and 8% in control group (p=0.03). Medication discrepancies were common in both groups.	
Stowasser, Collins and Stowasser, (2002)	240 patients were included; 113 in intervention group and 127 in control group.	To evaluate the effects of a medication liaison service on quality of medication-related information associated with hospital admission, risk of drug misadventure and other patient outcomes, and health resource utilisation. Medication Liaison Service; Drug history confirmed on hospital admission from GP and community pharmacy. Usual ward care. Discharge communication sent to GP and community pharmacist within 24 hours that included: duration of treatment, DRPs, supply issues, ADRs, allergies and new prescriptions.	RCT.	Intervention group had 12 readmissions v. 17 in control group. Just non- significant with p=0.055. The intervention group had increased clinical interventions, more interventions per patient and more changes to medicines but fewer visits to health care professionals.	Larger number of patients required to show statistically significant results.

Five of the nine studies included in Table 3-7 demonstrated a statistically significant reduction in hospital readmissions when patients had participated in some form of medication review (Naunton and Peterson, 2003; Schnipper *et al.*, 2006; Gillespie *et al.*, 2009; Hellström *et al.*, 2011; Luder *et al.*, 2015) and one study demonstrated a statistically significant increase (Holland *et al.*, 2005). The studies that showed a decrease in readmissions included 781 patients in various locations but of note is that none of the interventions were directly comparable to the MUR service that is currently operational in England. In two studies the intervention was initiated by hospital pharmacists prior to discharge (Schnipper *et al.*, 2006; Gillespie *et al.*, 2009), in a further two studies the intervention was more complex than a MUR (Hellström *et al.*, 2011; Luder *et al.*, 2015), and in one study the intervention was conducted in the patient's home (Naunton and Peterson, 2003).

Table 3-7 also shows that some studies have demonstrated positive effects of medication review on other outcomes such as the appropriateness of medications, adherence, and patient knowledge about their medicines (Nazareth *et al.*, 2001; Holland *et al.*, 2005; Hellström *et al.*, 2011). PD-MURs have also been shown to be useful in identifying medicines-related problems and contributing to cost savings. Ahmad *et al.*, (2014) conducted a study in the Netherlands on post-discharge medication review. They recruited 340 patients over 60 years old who were taking more than five prescribed medicines. They found that on average, each patient had 2.9 medicines-related problems post-discharge and the more medicines the patient was prescribed, the higher the chance of experiencing a medicines-related problem (Ahmad *et al.*, 2014). Ramsbottom, Rutter and Fitzpatrick (2018) conducted a PD-MUR study that involved referring hospital in-patients who were over 65 years for a PD-MUR after discharge. During the 9-month study period they managed to recruit just 30 patients to their study, of whom only 20 participated in a PD-MUR. Community pharmacists identified an average of 2 interventions per PD-MUR; these were mainly around the provision of information to the patient. It was estimated that the cost to community pharmacies of providing the service was £70.44 per PD-MUR, but the savings were estimated to be in the range of £113 to £255 per PD-MUR, which highlighted the potential cost saving to the NHS (Ramsbottom, Rutter and Fitzpatrick, 2018).

As previously mentioned, two of the studies in Table 3-7 that generated statistically significant results described the use of a home-based medication review model (Naunton and Peterson, 2003; Holland *et al.*, 2005). The study by Holland *et al.*, (2005) showed a statistically significant increase in hospital readmissions whilst the study by (Naunton and Peterson, 2003) showed a

decrease in hospital readmissions. Bowyer and Barnett (2005) and Petty (2005) have criticised the study conducted by Holland *et al.*, (2005) because it did not include a full clinical medication review, there was disparity between the intervention and control groups in terms of diagnosed conditions, the patients had recently been discharged from hospital and therefore had recently had their medicines reviewed, and it was unclear whether the interventions made by pharmacists to GPs were actioned. There was also no assessment of whether the readmissions were iatrogenic and therefore it was difficult to say that post-discharge home-based medication review by pharmacists definitely resulted in an increase in hospital readmissions (Bowyer and Barnett, 2005; Petty, 2005). The study by Naunton and Peterson (2003) was conducted in Australia where HMR is already a commissioned service.

Only the study by Luder *et al.*, (2015) described a service similar to the English PD-MUR but this was conducted in the US where the healthcare system is funded differently. There have been attempts to investigate the effect of PD-MURs more robustly, but difficulties in recruiting patients have been highlighted as a barrier (Ramsbottom, Fitzpatrick and Rutter, 2016). One large-scale study has been conducted using routinely collected administrative data covering nearly 300,000 community-pharmacist medication reviews over a 14-month period between 2012/13 in British Colombia, Canada. It found that medication review by community pharmacists did not result in a significant change in the number of prescriptions issued to patients, adherence, deprescribing or potentially inappropriate prescribing in the elderly (Kolhatkar *et al.*, 2016).

These studies highlight the apparent lack of strong evidence of MURs or PD-MURs having any effect on hospital admissions or readmissions. This is despite the fact that the UK Government spent £85.5 million on them in 2013/4 rising to £94.1 million in 2017/18 (PSNC, 2018i). The literature does show that there is some evidence to support specific types of medication review, for example reviews that take place in the patients' home, those that are focussed on a particular condition or medication and clinical medication reviews using the patients' medical notes. However, there appears to be a paucity of evidence to support unfocussed, adherence support medication reviews, such as the current UK community pharmacy MURs; especially in terms of measurable, hard outcomes such as hospital admissions or mortality.

3.6 Opinions about and experiences of MURs

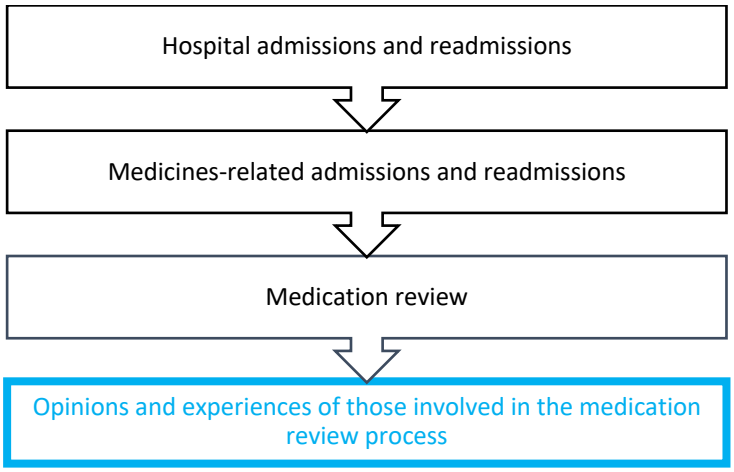


Figure 3-6 Literature review: Area Four – Opinions and experiences

3.6.1 Community Pharmacists

There have been several studies that have garnered the opinions and experiences of community pharmacists providing the MUR service; these studies have shown that there are various facilitators and barriers to community pharmacists conducting MURs.

3.6.1.1 Facilitators to conducting MURs

Latif, Boardman and Pollock carried out a mixed-methods study in Nottingham during 2008. They surveyed 280 community pharmacists working for multiples, directly observed 54 MUR consultations and interviewed a proportion of the pharmacists and patients about their experiences (Latif and Boardman, 2008; Latif, Pollock and Boardman, 2013). They found that community pharmacists working for multiples conducted more MURs if they worked over 20 hours per week, were store-based and had a dedicated consultation area (Latif and Boardman, 2008). Pharmacists were more likely to conduct MURs for patients who had good relationships with pharmacy staff and were therefore more likely to agree to participate in a MUR (Latif, Boardman and Pollock, 2013).

Another mixed-methods study involving a survey of 216 Primary Care Organisations (PCO) followed by interviews with 43 PCO representatives conducted by Bradley *et al.* (2008) found that multiples carried out more MURs than independents and pharmacies dispensing more items carried out more MURs (Bradley *et al.*, 2008).

Community pharmacists viewed MURs as an opportunity to engage in additional training (Bradley *et al.*, 2008; Harding and Wilcock, 2010) and extend their role (Latif and Boardman, 2008). They perceived MURs to be of high quality when they had the support of pharmacy staff (Harding and Wilcock, 2010), enhanced the patients' use of their medicines (Latif and Boardman, 2008), increased adherence, involved patients being give advice and resulted in changes to the prescription (Harding and Wilcock, 2010).

3.6.1.2 Barriers to conducting MURs

Latif and Boardman (2008) found that lack of time, staff support and suitable consultation areas were barriers to conducting MURs (Latif and Boardman, 2008). Bradley *et al.* (2008) found that fewer MURs occurred in areas of deprivation and for patients with long-term illnesses (Bradley *et al.*, 2008). Another study of 49 community pharmacists interviewed in 2007/8 found that workload pressures affected the delegation of tasks to other staff that would facilitate MUR activity (McDonald *et al.*, 2010).

Examples of poor-quality MURs were when there was a lack of support from GPs (Bradley *et al.*, 2008) who did not act on recommendations from the MUR (Harding and Wilcock, 2010) and did not provide any feedback (Wilcock and Harding, 2008).

3.6.1.3 Pressure to complete MURs

Studies of pharmacists' views of MURs have shown that patients taking simpler medication regimes are more likely to be offered a MUR compared to patients on complex regimes (Latif, Pollock and Boardman, 2011). This was generally for financial reasons as simple MURs would be quicker to complete for the same financial gain (Latif, Pollock and Boardman, 2011) ensuring that MUR targets were achieved and financial loss was avoided (Latif, Pollock and Boardman, 2013). Youssef, Karia and Hall (2011) received 80 responses from community pharmacists to their survey; when community pharmacists were asked about why the Department of Health had called for an improvement in MUR quality some thought that unnecessary MURs were being conducted for financial gain (Youssef, Karia and Hall, 2011). All MURs attract the same fee, currently £28, and some employee pharmacists felt the limit of 400 MURs, per pharmacy, per annum, was seen as a target rather than a limit (Bradley *et al.*, 2008; Harding and Wilcock, 2010; McDonald *et al.*, 2010; Youssef, Karia and Hall, 2011). Elvey, Hassell and Hall (2013) also found that pharmacists were put under pressure by non-pharmacist managers to complete MURs (Elvey, Hassell and Hall, 2013).

3.6.1.4 Opinions about PD-MURs

There is a paucity of evidence regarding the opinions of community pharmacists towards PD-MURs; just two studies were found. Rutter, Ramsbottom and Fitzpatrick (2017) surveyed 19 community pharmacists about their opinions of the PD-MUR service they had provided to patients who were referred from hospital as part of a feasibility study. The pharmacists reported that the main barrier to conducting PD-MURs was that certain patients were housebound and therefore unable to attend the pharmacy, and restrictions in conducting HMRs further compounded the problem (Rutter, Ramsbottom and Fitzpatrick, 2017). Meanwhile, Ensing *et al.* (2017) conducted a mixed-methods study of community pharmacists to establish the facilitators and barriers to initiating a HMR scheme for post-discharge patients. The facilitators that emerged were good interprofessional collaboration between primary and secondary care and the community pharmacists' skills in communication and pharmacotherapy. The barriers were identified as having an adequate reimbursement fee and the ability of pharmacists to incorporate home visits into their daily schedule (Ensing *et al.*, 2017).

3.6.1.5 Information requirements for conducting MURs and PD-MURs

When community pharmacists were asked about the information they required to conduct effective PD-MURs, Bruhwiler, Hersberger and Lutters (2017) found that they thought the following were essential: patient details, list of discharge medicines, changes made to medicines whilst in hospital, if any off-label medicines were prescribed, allergies and the contact details of the prescribing doctor (Bruhwiler, Hersberger and Lutters, 2017). Additionally, in the study reported by Latif and Boardman (2008), community pharmacists thought a lack of access to the patients' medical notes reduced the benefit of a MUR; although the authors proposed that this showed some pharmacists viewed MURs as a clinical rather than a concordance review (Latif and Boardman, 2008). These studies underline the desire of community pharmacists to have access to the appropriate information to enable them to provide patients with the best possible care.

3.6.1.6 Professionalism in community pharmacy

Elvey, Hassell and Hall (2013) interviewed 43 pharmacists from community, hospital and CCGs about professionalism. Based on the opinions and experiences of participants, the authors devised nine different descriptors: the scientist, the medicines adviser, the clinical practitioner, the social carer, the medicines maker, the medicines supplier, the manager, the business

person and the unremarkable character (Elvey, Hassell and Hall, 2013). When pharmacists are providing MURs and PD-MURs in the community they ideally need to see themselves as 'medicines advisers' or 'clinical practitioners' in preference to any of the other descriptors.

Another study looked at how community pharmacists contributed to 'social order' with the authors suggesting pharmacists were intervening when disorder (in patients' medications) was not present and therefore performing MURs predominantly for commercial reasons. The authors postulated that both of these factors could undermine the professionalism of community pharmacists (McDonald *et al.*, 2010).

3.6.1.7 Summary of community pharmacists' opinions of the MUR and PD-MUR service

These studies show that community pharmacists are keen to be involved in medicines review services especially for the benefit of their patients. They are willing to take advantage of the training opportunities to provide a high-quality service. Their efforts are hampered by a lack of support staff, time and, in some circumstances are under pressure to conduct high-volume rather than high-quality reviews.

The PD-MUR service could be developed to allow community pharmacists to conduct reviews in the patient's home and permit community pharmacists to access the patient's medical record. Only two studies were found that exclusively investigated the opinions of community pharmacists about PD-MURs (Ensing *et al.*, 2017; Rutter, Ramsbottom and Fitzpatrick, 2017), therefore more research in this area is warranted.

3.6.2 GPs

The opinions and attitudes of GPs towards MURs and community pharmacists providing the service have also been investigated. Wilcock and Harding (2007) outlined the results of a survey of 52 GPs from one Primary Care Trust (PCT) in south west England shortly after the introduction of the MUR service. Sixty per cent of GPs thought they had a good working relationship with their community pharmacist, 96% were aware of MURs and 88% had received a completed MUR form from their community pharmacist. GPs highlighted the good points about MURs such as increased patient understanding of their medicines and pharmacists advising on compliance problems or interactions and ADRs. GPs did seem to be quite negative towards some aspects of MURs and were critical when pharmacists: advised them of monitoring that had already been carried out; conducted a MUR for a patient whose

GP practice had recently completed a review and discussed side effects with patients when the GP had already assessed the risk-benefit of the treatment. The authors proposed that this reflected on the GPs as the patient had brought up these issues as part of the MUR discussion with the pharmacist and therefore some resolution was required (Wilcock and Harding, 2007).

The study conducted by Latif, Pollock and Boardman (2013) found a lack of evidence for engagement from GPs with the MUR service. This was because they did not refer patients for MURs, or aid in the identification of patients who would be suitable for the service. GPs did not feedback to community pharmacists on the outcomes of the interventions they had made, pharmacists felt that GPs overlooked the service and there was some evidence that pharmacists were deferential to GPs (Latif, Pollock and Boardman, 2013). There were similar findings from another study in which it was reported that GPs did not place any value on the content of MUR forms (McDonald *et al.*, 2010). Latif, Pollock and Boardman (2013) suggested that a more 'joined-up' service was required, that cut across traditional boundaries to support and benefit patients (Latif, Pollock and Boardman, 2013).

A piece written by Howard Stoate, a GP and past chair of the All-Party Parliamentary Group on Pharmacy, also criticised MURs. His opinion was that they increased GPs workload by providing GPs with information which they did not have the time to use and the form was too long and difficult to input into the GP computer system (Stoate, 2006). It should be noted that since this time the MUR form has been revised and is more succinct (PSNC, 2018b).

A commentary paper by Chen and Almeida Neto (2007) examined the collaboration between pharmacists and GPs. They found that typically, interactions were episodic and informal, and strong collaborative relationships were the exception rather than the norm; this constituted a 'significant cultural barrier'. The MUR process assumed that any recommendations made by the community pharmacist were automatically implemented by the GP, but this was not always the case. They postulate that face-to-face discussions of the MUR process between community pharmacists and GPs would increase trust in the relationship, result in greater cooperation and increase the quality of interactions (Chen and Almeida Neto, 2007).

Based on this evidence, it appears that MURs are not fully understood or appreciated by all GPs. This means that community pharmacists are placed in a difficult position; on the one

hand being encouraged to conduct MURs, and on the other, receiving negative or no feedback from GPs about the service.

3.6.3 Patients

It is vitally important to understand patients' views and experiences of MURs if the service is to be optimised and, in time, driven by patients and other HCPs rather than just community pharmacists. A questionnaire survey of 232 users of four community pharmacies in England examined what information patients with chronic conditions required from community pharmacies and assessed their adherence to medication, dependent on whether they had received an advanced community pharmacy service such as a MUR or NMS (Twigg *et al.*, 2016). Patients who had received an advanced service were statistically significantly more likely to be satisfied with the level of medicines information they had received (p=0.001) and the likelihood of them being adherent to their medicines was doubled, OR 2.34 (95%CI 1.21-4.53), p=0.012. They did have some unmet needs with regard to the medicines information they required which had not been fulfilled by the advanced service they had received (Twigg *et al.*, 2016).

Other studies have also shown that patients' adherence and knowledge about their medicines has improved. Of 81 patients, from one community pharmacy in the Midlands, who were surveyed after they had participated in a MUR, 68% felt they knew more about their medicines and 83% said their adherence to their medicines had increased. Patients over 65 years perceived that they had gained more benefit from the MUR than younger patients (Youssef, Hussain and Upton, 2010). Meanwhile, in Australia, White, Klinner and Carter (2012) conducted 14 focus groups with 87 patients to investigate their views of the HMR programme. Patients reported that the main advantages were feeling cared for, reassured, gaining new knowledge about their medicines and feeling they could speak to their GP about medication changes (White, Klinner and Carter, 2012).

Conversely, Latif, Boardman and Pollock (2013) reported opposing findings in their MUR study. They investigated patients' perspectives of MURs by interviewing 34 patients who had participated in an observed MUR. They found patients reported MURs to be satisfying and interesting, but they did little to alter the way they took their medicines or increase their knowledge about them. Patients did not feel reassured about their medicines and were more likely to accept advice if they perceived it to be beneficial or easy to implement (Latif, Pollock

and Boardman, 2013). It should be noted that this study had fewer participants than those reported above.

There appears to have been some confusion from patients about the purpose of a MUR. In the study by Latif, Pollock and Boardman (2013), some patients thought MURs were an activity that pharmacists were required to complete and agreed to a MUR to assist the pharmacist. Patients generally accepted the offer of a MUR from their usual pharmacist, due to politeness and co-operation, but would not from an unfamiliar pharmacist. They valued the opportunity to discuss their medication, but some viewed the MUR as simply a check of their medicines or a monitoring activity (Latif, Pollock and Boardman, 2013). In an Australian study of patients views towards the HMR service, some patients though they were an adherence check (White, Klinner and Carter, 2012).

Patients also voiced concerns about participating in MURs for other reasons; in more than one study patients were worried about how a MUR would impact on their relationship with their GP. Latif, Pollock and Boardman (2013) found that patients had concerns about MURs interfering with their GPs' prescribing, and also impacting on their relationship with their GP. The authors proposed that if patients had more complex problems with their medicines they would discuss them with their GP (Latif, Boardman and Pollock, 2013). A qualitative study of 26 known users and non-users of community pharmacy services in Scotland investigated public trust in services provided by community pharmacies relative to those provided by GPs. Patients with long-term conditions were much more likely to report consulting their GP as they were the HCP who had access to their medical records, were able to diagnose, prescribe and refer to specialists; all tasks that a community pharmacist would not be able to complete. The participants trusted their GPs much more than pharmacists; this was partly because they were able to build strong relationships with their GP over time. The relationships they had with community pharmacists were more fragmented and rarely sustained. There was also some conflict from the patients about the commercial aspects of the community pharmacy and whether the community pharmacists would prioritise profit or patient care (Gidman, Ward and McGregor, 2012). In Australia, patients reported the following barriers to the HMR service; concerns about affecting their relationship with their GP, worries about the privacy and safety of the home visit, their confidence interacting with a pharmacist they did not know and their own pride and independence being undermined (White, Klinner and Carter, 2012).

In summary, patients in several studies have reported that MURs increased their adherence and knowledge about their medicines and made them feel more cared for, but some had concerns about how participating in a MUR would affect their relationship with their GP. Patients were not always clear about the purpose of a MUR. Gidman, Ward and McGregor (2012) suggested that the use of extended pharmacist services were being undermined by the lack of trust from patients and possible ways to resolve this would be to increase the number and type of interactions between patients and pharmacists and having GPs' support or endorsement for extended services (Gidman, Ward and McGregor, 2012).

3.7 Summary of literature review chapter

This literature review has demonstrated that there is very little published evidence for the effectiveness of MURs conducted by community pharmacists in the pharmacy on outcomes such as hospital admission rates, morbidity and mortality. There is some evidence from small scale studies showing the benefit of home-based medication reviews and MURs targeted at patients with specific conditions. Nonetheless, MURs as provided by community pharmacists in England, have shown benefit for patients in terms of increased knowledge about medicines and improved adherence.

Patients, GPs and community pharmacists have differing and sometimes opposing views about the MUR service and the role of community pharmacists in providing advanced services for patients over and above their dispensing function. The attitudes of individuals also appear to be determined by whether they have experienced beneficial interactions with community pharmacists previously.

In the current study, one of the aims is to determine how pharmacists can use their skills, and tools such as PD-MURs, to help patients manage their medicines better once they are discharged from hospital, with a view to reducing medicines-related hospital admissions. This literature review has set the scene in terms of medicines-related admissions and readmissions to hospital, the scale of the issue, the medicines implicated and the views of patients and HCPs. The next chapter will provide an overview of the methodological theories underpinning the different phases of the study. This is then followed by the chapters explaining the methods, results and a brief discussion of each phase of the fieldwork.

4 Methodology

Chapter Overview

This chapter will focus on the methodology that was employed in the study. It starts with an outline of the philosophical approach that was taken. As this study used a mixed methods approach, a summary of the rationale for mixing methods is then presented.

4.1 Introduction

This chapter presents the underpinning methodology for the current study. The methods for each phase of the study are not presented in this chapter but are included in Chapters 5, 6, 7 and 8. This is to ensure that all pertinent information, such as the methods, results and a brief discussion, for each stage of the study are found together, in the same chapter. The rationale for this is to aid the reader in navigating the thesis and understanding how each phase was conducted and allowing them to appreciate how each phase informed the subsequent phases. The Discussion, chapter 9, will discuss the results of the thesis as a whole.

4.2 Methodology

Methodology is the 'system of methods used in a particular area of study ' (Oxford University Press, 2019), and is underpinned by the stance the researcher has taken when conducting the research. This chapter initially focusses on the theoretical underpinnings of the research before discussing and justifying the use of a mixed methods approach.

4.2.1 Ontology, epistemology and methodology

The nature of the research process means that researchers must consider the underlying beliefs or paradigms on which their study is based. A research paradigm, or worldview, is a set of assumptions or beliefs about the 'world' and the place of individuals within it (Guba and Lincoln, 1994). There are essentially four main elements of each paradigm:

- **Ontology** – what is the nature of reality and what can be known about it?
- **Epistemology** – what is the relationship between the 'world' and the researcher?
- **Methodology** – how can the researcher find out what they want to know about the 'world'.
- **Methods** – the procedures and techniques used to collect and analyse data.

(Guba and Lincoln, 1994)

The answers to these questions vary, depending on the stance that the researcher takes. There are various competing research paradigms and authors classify them in different ways, hence the overarching theories are presented here:

- ***Positivism***: the ontology of positivism is realism, the epistemology is objectivism (Crotty, 1998; Scotland, 2012) and the methodology used aims to explain relationships (Scotland, 2012). This approach aims to test a theory through the collection of observations or measurements and is objective in nature so the researcher can investigate the object without influencing it or being influenced by it (Guba and Lincoln, 1994; Bryman, 2008; Creswell, 2014). This view includes realist knowledge generation; that through the collection of appropriate data, the researcher can establish what reality is. The researcher only has to discover the patterns, structures or laws to determine what happens in the real world (Willig, 2012). Hypotheses are stated and tests can be used to verify them (Guba and Lincoln, 1994) meaning that the data generated are generally quantitative.
- ***Interpretivism***: the ontology of interpretivism is relativism, the epistemology is subjectivism (Crotty, 1998; Scotland, 2012) and the methodology aims to understand the issue of interest from an individual's perspective (Scotland, 2012). This suggests that each individual has a subjective experience and interpretation of the world. It acknowledges that there is more than one reality, and this lends itself to the use of qualitative methods to discover the different lived experiences of individuals. There is also a recognition that the researcher brings their own prior knowledge and experiences to the research meaning they are linked to the object. This position does not usually test a predetermined theory but rather aims to generate its own theory or meaning (Guba and Lincoln, 1994; Bryman, 2008; Willig, 2012; Creswell, 2014).

Another paradigm that exists is that of pragmatism; where researchers can use any methods, techniques and procedures that will enable them to better comprehend the problem being

investigated. Researchers use 'what works' and utilise whichever approaches are necessary to understand the issue. This view underpins the mixed methods approach (Creswell, 2014).

4.2.2 Mixed methods

Mixed methods research has been defined as:

> "the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration."
>
> (Johnson, Onwuegbuzie and Turner, 2007)

The technique has been attributed in the first instance to Campbell and Fiske who, in 1959, described the use of more than one technique to validate, or triangulate, data to ensure that their results were valid (Johnson, Onwuegbuzie and Turner, 2007).

4.2.2.1 Rationale for the use of mixed methods

The decision to choose mixed methods can be multifactorial but is broadly because qualitative and quantitative techniques produce different types of data and for some research questions a combination is better suited to the subject of interest.

There are many reasons for mixing methods. Bryman (2008, pp. 608–609) has specified sixteen main reasons why researchers mix methods. In relation to the current study the rationale for mixing methods was for the following reasons:

- **Triangulation** – the combination of both qualitative and quantitative approaches to triangulate or corroborate the findings.
- **Offset** – offsetting the limitations of both qualitative and quantitative methods to maximise the strengths of each.
- **Completeness** – using both qualitative and quantitative methods to gain a more complete account of the area being investigated.
- **Different research questions** – if the research question has multiple parts, qualitative and quantitative methods can be used to answer each part.
- **Explanation** – when one method helps to explain the other.

- **Unexpected results** – when one method is used to explain unexpected results from the other method.
- **Instrument development** – when the results of the qualitative phase are used to develop an instrument to collect quantitative data (in a sequential exploratory strategy).
- **Credibility** –using both methods enhances the integrity of the research.
- **Utility** – when combining both methods provides results that will be more useful to practitioners.
- **Enhancement** – when a second method is used to build on findings from the initial method.

4.2.2.2 Choice of mixed methods format

Mixed methods studies can use a variety of different formats depending on the order in which data are collected, the emphasis given to the different stages of the study and where the 'mixing' occurs (Creswell, 2014). In this study it was decided to collect the qualitative data first to gain a fuller understanding of the individuals, the system and their experiences. These data were then analysed to inform the development of the questionnaire which generated the quantitative data. This technique is defined as the sequential exploratory strategy as each phase is given equal weight and one phase follows on from the other. This method is well suited if a tool needs to be developed for the quantitative phase of data collection (Creswell, 2014), see Figure 4-1.

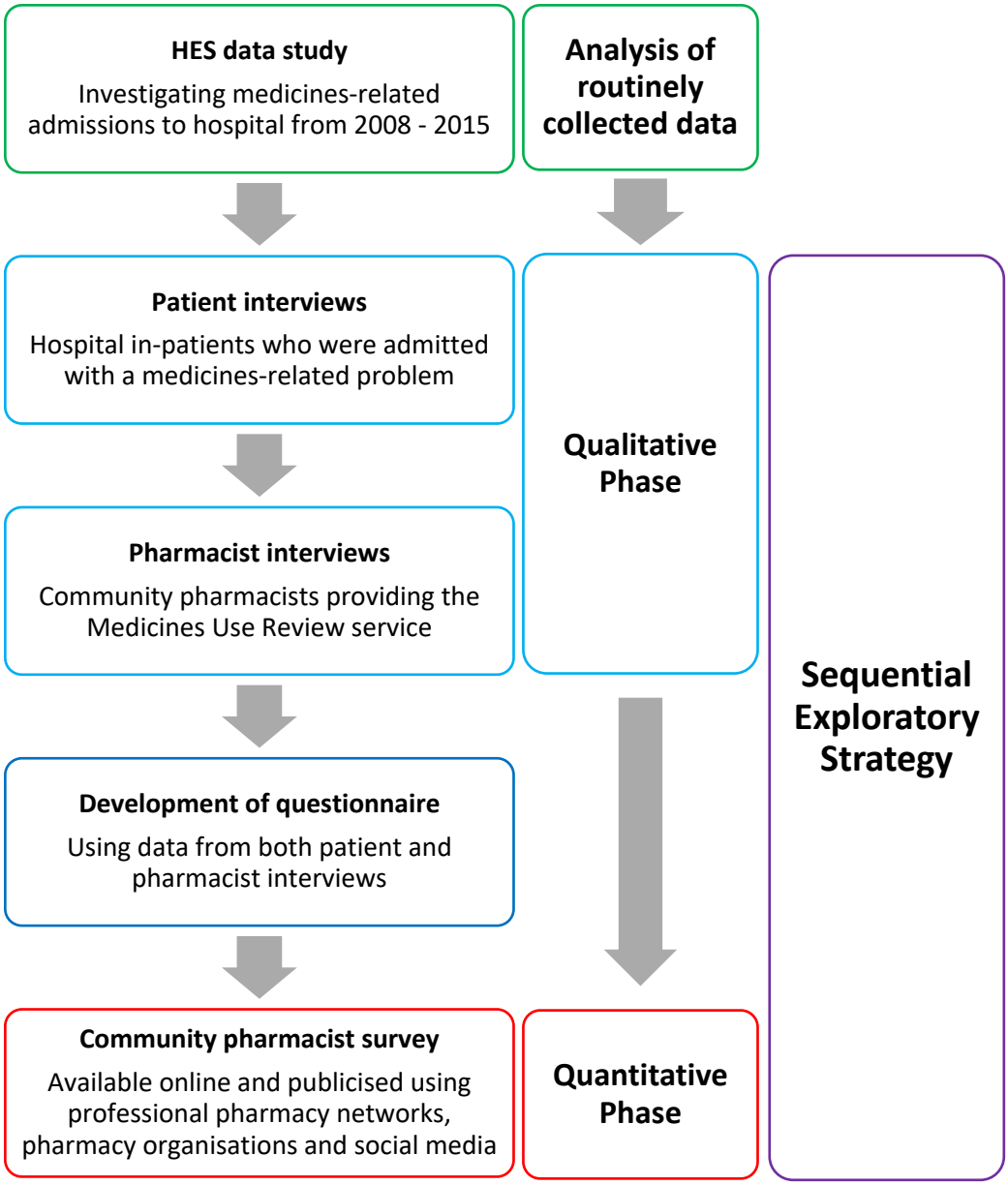


Figure 4-1 Schematic of Sequential Exploratory Strategy

As with all techniques, there are advantages and disadvantages of employing the sequential exploratory strategy. The advantages are that a tool, in this case a questionnaire, can be developed based on the results of the qualitative phase and therefore has some evidence underpinning the choice of questions asked. The disadvantages are that, due to the sequential nature there is a large time commitment to ensure that each phase can run in the correct order and sufficient time is allowed for all of the stages involved.

Often studies conducted using the sequential exploratory technique use the same population for the qualitative and quantitative phases of the study. In this instance two different populations were included in the qualitative phase; patients and community pharmacists. This was to ensure that a wider breadth of information was gathered about the patients' and community pharmacists' experiences. This enabled the questionnaire to ask the correct questions to gain as full an insight as possible into the community pharmacists' attitudes and experiences towards MURs.

The mixed-method approach was chosen as it would allow the research questions to be answered more effectively. The research questions, which are restated below, cannot be answered using a single qualitative or quantitative technique; they require both types of data to give a thorough and convincing picture of the current landscape of post-discharge medicines support, its potential relationship to medicines-related hospital admissions, and to enable recommendations to be made about how to improve the system.

Research questions:

1. Are medicines-related admissions to hospital a problem in England and what medicines are implicated?
2. What are the experiences of patients who have had a medicines-related admission to hospital?
3. What are the experiences and attitudes of patients towards PD-MURs and medication reviews in general?
4. What are the attitudes of community pharmacists conducting PD-MURs and do these attitudes have any effect on the engagement of community pharmacists with PD-MURs?

4.2.2.3 Mixed methods and theoretical perspectives

Creswell & Plano Clark (2011) subscribe to a similar view as Crotty (2003) in terms of how they view the inter-relationships between worldviews, philosophical perspectives, methodology and methods. They present various philosophical assumptions that are made when conducting mixed methods research. In this study, which used the sequential exploratory strategy, for the initial qualitative phase an interpretivist stance is assumed. This indicated that the study was aiming to find out what the experience was like for an individual and how they ascribed meaning to their experience. The results of this phase were then analysed to inform the

development of an instrument for the quantitative phase of the study. The assumptions for the quantitative phase of the study were based on a positivist stance where less emphasis was given to how an individual attributed meaning to their experiences and greater emphasis was given to trying to discover the 'real world'.

4.3 Overview of methods used

For this study there were various different methods employed at different phases of the research. Figure 4-1 gave an overview of the study in a graphical format showing the distinct phases. The methods used for each phase are shown in Table 4-1.

Table 4-1 Methods used, data generated, and analytical techniques used in fieldwork

Stage of study	Source of data	Analytical technique used
HES data study.	Routinely collected HES data.	Quantitative descriptive analysis.
Patient interviews.	Semi-structured interviews.	Interpretative phenomenological analysis.
Pharmacist interviews.	Semi-structured interviews.	Thematic analysis.
Community pharmacist survey.	Questionnaire.	Quantitative descriptive and inferential analysis of numerical data and linkage to demographic data. Factor Analysis. Qualitative thematic analysis of free text responses.

As mentioned at the start of this chapter, a description of the methods for each stage of the study are included in the corresponding chapter.

4.3.1 Ethical considerations

When conducting research, it is vitally important that ethical considerations are made at all stages of the study. This is essential not only to protect the participants but also the researchers conducting the study. The Economic and Social Research Council have six key principles of ethical research:

- research should aim to maximise benefit for individuals and society and minimise risk and harm.
- the rights and dignity of individuals and groups should be respected.
- wherever possible, participation should be voluntary and appropriately informed.
- research should be conducted with integrity and transparency.

- lines of responsibility and accountability should be clearly defined.
- independence of research should be maintained and where conflicts of interest cannot be avoided, they should be made explicit.

(Economic and Social Research Council, 2018)

In order to obtain the necessary approvals to conduct the study, it was mandatory to detail the ethical considerations. The considerations for each stage of the study are explained in Chapters 5, 6, 7 and 8.

4.3.2 Ethical approvals

The protocol and related documents for the study were reviewed by the required NHS and University panels and approvals were granted as follows:

- University of Bath's agreement to act as sponsor under the Department of Health's Research Governance for Health and Social Care (2005) framework on 30th April 2015.
- NHS research ethics committee approval was gained from the National Research Ethics Services (NRES) Committee, East Midlands, Nottingham 2, on 11th June 2015, reference 15/EM/0239.
- NHS Research and Development service approval for the study to be conducted at Gloucestershire Hospitals NHS Foundation Trust was received on 1st July 2015, reference 15/003/MTS.

Due to the nature of the sequential exploratory strategy, with the plan to develop the questionnaire based on the findings from the preceding qualitative phases of the study, it was necessary to first gain approval for the qualitative phases only. Once these phases were completed and the questionnaire developed, it was necessary to gain approval for the quantitative phase of the study. As previously agreed, an amendment was submitted to the NRES committee but in the interim period, the process for gaining NHS approvals for conducting research changed. Health Research Authority (HRA) approval was required in place of the previous local R&D approval. These approvals were granted and are detailed below:

- NHS research ethics committee East Midlands, Nottingham 2, amendment approval on 13th January 2017, amendment number SA1.
- HRA approval on 18th January 2017.

Copies of the ethical approval documents are included in Appendix B.

4.4 Summary of methodology chapter

This chapter has provided a synopsis of the methodology that underpinned this study. It has stated the rationale for the methodology used and the basis for using a mixed methods approach; the sequential exploratory strategy. The following chapters describe the methods, results and a brief discussion of each phase of the fieldwork conducted during the study. This starts with the HES data study.

5 Hospital Episode Statistics Study

Chapter Overview

This chapter presents the findings of the preliminary phase of fieldwork that utilised routinely collected data, namely hospital episode statistics, to determine whether medicines-related admissions to hospital have changed over time. A summary of the methods used to collect and analyse the data is presented, followed by the results. To conclude the chapter is a brief discussion of how these results compare to other studies that have used HES data in the published literature.

5.1 Introduction

This chapter will concentrate on the analysis of HES data that are routinely collected by all NHS hospitals in England. The rationale for conducting this preliminary work was to determine whether medicines-related admissions to hospital were a growing or diminishing problem. A previously published paper by Wu *et al.* (2010) focused on medicines-related hospital admissions from 1999 to 2009 and the aim of this phase of the study was to analyse more recent data to discover whether the situation had changed.

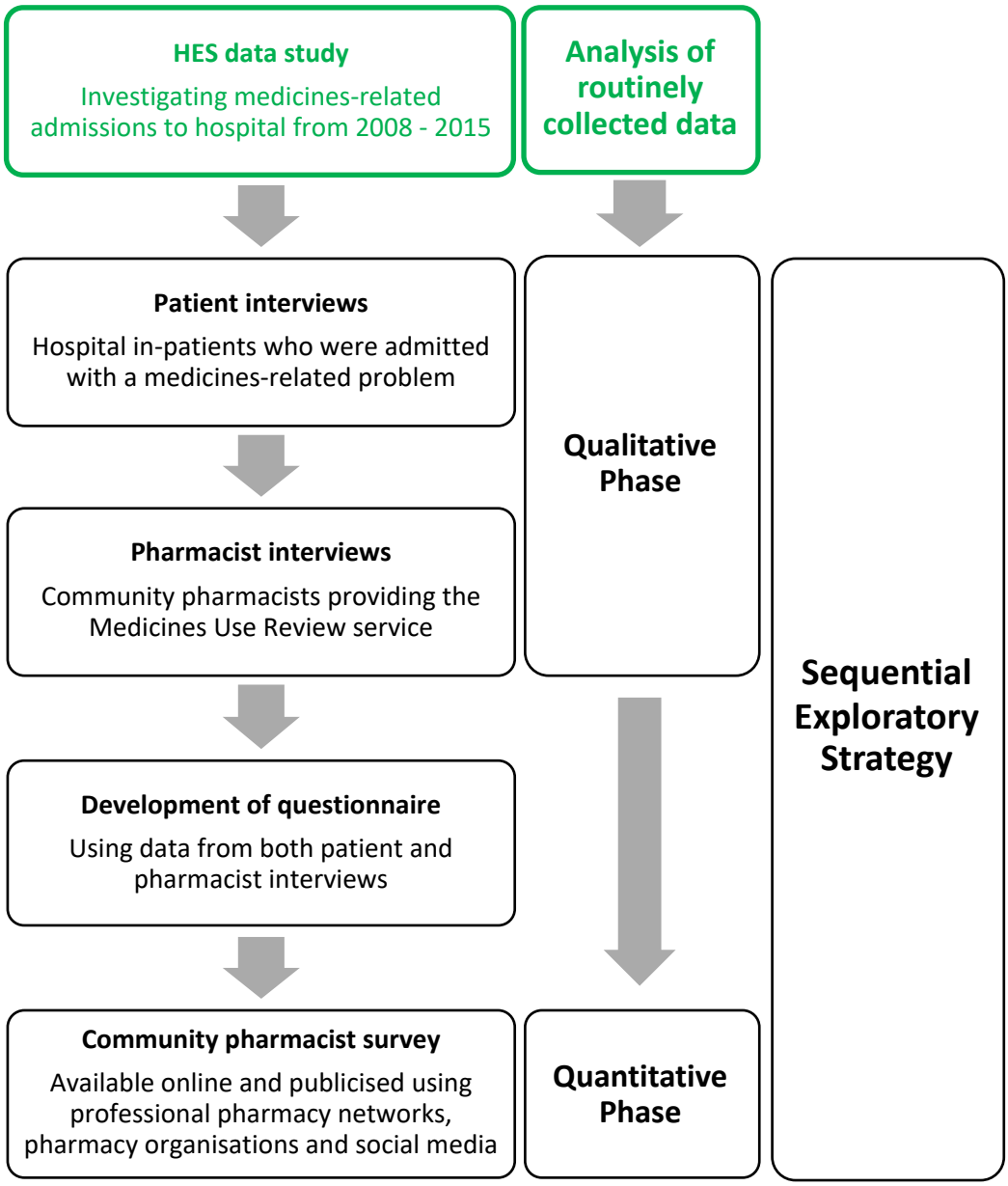


Figure 5-1 Schematic of study – HES data study

5.2 Methods for the HES study

This phase of the study focussed on using routinely collected, HES data from NHS Trusts in England, to determine whether the burden of medicines-related admissions to hospital had changed between 2009 to 2015. The rationale for choosing these dates was based on a previously published paper Wu *et al.* (2010) which covered the years from 1999 to 2009. Wu *et al.*, (2010) investigated medicines-related admissions to NHS hospitals in England and reported that they were an increasing problem over the time period they studied. The first phase of the

current study used publicly available HES data to try and establish whether medicines-related admissions to hospital were still an increasing problem and if the medicines implicated in these admissions had changed over time.

5.2.1 Critique of published paper by Wu *et al.* (2010)

The paper written by Wu *et al.* (2010) was published in the Journal of the Royal Society of Medicine. It was assessed using the RECORD statement (Benchimol *et al.*, 2015) which is the reporting guideline for studies conducted using routinely-collected health data. This checklist showed that the authors reported most of the items that should be included in a high-quality study. The title and abstract detailed the type of data included, the database used and the geographical area and timeframe of the study. It did not, however, include information about the linkage between databases.

The main body of the paper included information about the selection of the population and details of the ICD-10 codes that were used in the study and available in an appendix. Although validation of the included codes was not specified, detailed methods were provided. Details about how records were linked was included in the text but there was no accompanying annotated diagram to summarise the process or a description of methods of data linkage. The authors did not include details of the extent of their access to the HES database or include information about how the data were cleaned.

Finally, the authors did include a discussion about the limitations of using routinely collected data for research. On the whole, the paper performed well against the criteria in the RECORD statement. It must be borne in mind that the paper was published before the RECORD statement had been developed.

A note about nomenclature: Wu *et al.* (2010) used the term ADR in their paper and this term has been used in this chapter. They defined an ADR as ‘an undesirable effect of a drug beyond its anticipated therapeutic effects occurring during clinical use’.

5.2.2 The HES database

As briefly discussed in section 3.3.1, HES data are collected and submitted each month by every NHS hospital trust in England, detailing in-patient admissions, out-patient appointments and ED attendances (NHS Digital, 2018b). Although the data are collected primarily for

payment purposes, they are designed to be used for non-clinical purposes also. The in-patient data have been collected since 1989 and the monthly reports are freely available on the NHS Digital website (NHS Digital, 2017c, 2017b).

Each HES record contains data on an individual patient admitted to a NHS hospital in England and includes details such as their diagnosis, age, gender, ethnicity, dates of admission and discharge and geographical information about the hospital and where the patient lives (NHS Digital, 2018b). There are strict rules which ensure that if there are small numbers of patients that fall into a particular category the numbers are supressed to avoid patients being identified, thereby maintaining patient confidentiality (NHS Digital, 2018b).

Each record in the database that relates to hospital admissions is referred to as a 'finished consultant episode' (FCE); this is the time a patient is under the care of one consultant in a particular hospital. If the patient transfers to the care of a different consultant or moves to a different hospital, this would represent another FCE (NHS Digital, 2015b).

5.2.3 Ethical considerations of using routinely collected data

The use of routinely collected data for research purposes does raise some ethical issues, especially if data are linked, which does involve a form of identification, even if results are then anonymised.

The use of routinely collected patient data for health research has been discussed by Foster and Young (2011) who considered the ethical implications of using these data for research. The majority of patients are willing to allow their routinely collected data to be used for research, although it can depend on several factors including the data required and the purpose of the research (Foster and Young, 2011).

Patients have often consented to the use of their data for research, such as the 'secondary uses service' within the summary care record (SCR), but it is debateable whether they fully understand that data about them, although anonymised, will be used for research purposes, hence they may not have made a truly informed choice or consent (Foster and Young, 2011). It would be impossible to gain informed consent from every patient in a database such as HES.

Research using routinely collected data can have societal benefits, but this assumes that the research is 'good' or 'important'. It is often assumed that patients have a responsibility to help others through 'altruistic participation' (Foster and Young, 2011).

In the current study only publicly available, anonymised data were used and no linkage of records occurred, hence it was not possible to identify any individuals. The study protocol received ethics approval from the bodies detailed in section 4.3.2.

5.2.4 Sampling of HES database

HES data use ICD-10 (WHO, 2018) for coding the diagnoses of each hospital admission. HES annual reports are published and publicly available on the NHS Digital website (known as the Health and Social Care Information Centre, until July 2016 (NHS, 2016)). The datasheets for emergency in-patient admissions from 2008/9 to 2014/15 were used for this study so that the data followed on from that used by the Wu *et al.* (2010) study.

5.2.5 Data extraction and checking

The study by Wu *et al.* (2010) contained a list of four-character ICD-10 codes that indicated a medicines-related admission to hospital had occurred. This was based on the use of the following keywords: 'adverse drug reaction', 'drug-induced', 'due to drug', 'due to medicament' or 'drug allergy'. They also included ADRs that were due to immunisations as they considered vaccines to be a medication. The same list was used for this study, see Table 14-1 in Appendix C. Table 14-2 in Appendix C illustrates the codes that indicated a particular medicine was responsible for the admission, known as external codes. For the purposes of this study, any admission that was due to an overdose was excluded as it could not be determined from the data whether this was intentional or accidental.

The HES annual reports were scrutinised and emergency admissions that had one of the ICD-10 codes of interest as the primary diagnosis, or an external code in any diagnoses field were included in the study. There was no linkage in the current study as only the publicly available part of the database was used.

For each ICD-10 code or external code of interest, for each year, the number of FCEs and bed days were copied into a spreadsheet that was created in Microsoft Excel (2013). As this involved a vast amount of data, a 10% sample was checked to ensure that the data had been entered correctly.

5.2.6 Analysis

To analyse the data, formulae were used in Excel to total the FCEs and bed days for each ICD-10 and external code. The data relating to the ICD-10 codes were then combined into 'chapters', which group similar diagnoses/causes together, as per the ICD-10 coding system.

5.3 Results of HES study

5.3.1 Emergency hospital admissions

Table 5-1 shows that between 2008 and 2015 there were 37,085,460 all-cause emergency admissions to hospitals in England; of these 541,416 (1.5%) were due to an ADR. The number of all-cause emergency admissions increased from 5,010,670 in 2008/9 to 5,615,707 in 2014/15, representing an increase of 12.1%. The total number of emergency admissions that were coded as being due to an ADR increased from 60,055 in 2008/9 to 92,114 in 2014/15, representing an increase of 53.4%. These data show that the proportion of emergency hospital admissions that were due to ADRs increased from 1.2% in 2008/9 to 1.6% in 2014/15, demonstrating that the burden of ADRs is increasing in the NHS in England year-on-year.

Table 5-1 Total number of emergency hospital admissions and emergency hospital admissions for which there was a primary diagnosis or external cause of an ADR

	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	% change 2008-2015
Total number emergency admissions	5,010,670	5,177,887	5,287,032	5,242,839	5,336,043	5,415,462	5,615,707	12.1
Emergency admissions with drug-induced code	7,421	8.026	8,759	8,796	9,390	9,994	10,512	41.7
Emergency admissions with external cause code	52,634	59,973	65,023	68,481	72,642	78,163	81,602	55.0
Total emergency admissions due to ADRs	60,055	67,999	73,782	77,277	82,032	88,157	92,114	53.4
Percentage emergency admissions due to ADRs	**1.2**	**1.3**	**1.4**	**1.5**	**1.5**	**1.6**	**1.6**	

5.3.2 Bed days utilised

Table 5-2 shows the number of bed days utilised for all causes decreased from 51,841,443 in 2008/9 to 48,183,084 in 2014/15, representing a decrease of 7.1%. Over the same period, the number of bed days that were utilised due to an ADR increased from 625,011 in 2008.9 to 947,016 in 2014/15, representing an increase of 51.5%. The percentage of the total bed days that were used due to an ADR increased from 1.2% in 2008/9 to 2.0% in 2014/15, again showing that ADRs are an increasing problem for the NHS in England.

Table 5-2 Total number of bed days and number of bed days utilised for a primary diagnosis or external cause of an ADR

	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	% change 2008-2015
Total number of FCE bed days	51,841,443	51,483,494	51,210,196	48,631,585	48,214,537	47,651,028	48,183,084	-7.1
Number of bed days with drug-induced code	82,142	81,047	92,200	84,478	92,264	90,086	95,150	15.8
Number of bed days with external cause code	542,869	625,025	667,375	676,391	726,541	806,184	851,866	36.3
Total FCE bed days due to ADRs	625,011	706,072	759,575	760,869	818,805	896,270	947,016	51.5
Percentage FCE bed days due to ADRs	**1.2**	**1.4**	**1.5**	**1.6**	**1.7**	**1.9**	**2.0**	

5.3.3 Emergency admissions due to ADRs by ICD-10 code

The ICD-10 diagnoses codes that indicated an ADR had occurred were combined into their corresponding ICD-10 chapters; a chapter contains ICD-10 codes that are linked, generally by body system. The results, by chapter, are presented in Table 5-3. Some of the numbers of patients in certain chapters are quite small and show high levels of variation from year to year as they include conditions that are rare.

In 2014/15, the main reason that patients were admitted to hospital as an emergency due to an ADR were for mental and behavioural disorders due to drugs, followed by complications following injection, immunisations or anaesthesia, and then cardiovascular consequences due to drugs. From 2013 to 2014 there was a 4.4% increase in the number of prescription items dispensed for the central nervous system; this category includes medicines used to treat mental health conditions, insomnia and pain (Prescribing and Medicines Team HSCIC, 2015b), which are more likely to result in this type of ADR.

Looking at the temporal trends, between 2008/9 and 2014/15, ADR-related hospital admissions caused by mental and behavioural disorders increased by 95%, toxic liver disease increased by 87.7% and drug-induced metabolic disorders increased by 79.1%. The increase in the last category was solely due to emergency admissions for drug-induced hypoglycaemia without an accompanying coma. Between 2005/6 and 2014/15, there was a 74% increase in the number of prescriptions for all medicines used to treat diabetes and a 41.4% increase in the number of prescription items for insulins (Prescribing and Medicines Team HSCIC, 2015a). This huge increase in prescribing could explain the corresponding increase in emergency admissions for hypoglycaemia.

Between 2008/9 and 2014/15, the only category to show a decrease in emergency hospital admissions were those due to drug-induced cataracts or hearing loss but no conclusions can be drawn about this as such small numbers were involved.

Table 5-3 Summary of emergency hospital admissions due to ADRs by ICD-10 chapter

		2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Chapter								
D	Drug-induced anaemia	113	102	114	130	151	170	156
E	Drug-induced metabolic disorders	627	753	904	945	1,037	1,090	1,123
F	Mental and behavioural disorders due to drugs	1,481	1,568	1,789	1,874	2,189	2,378	2,888
G	Drug-induced neuromuscular disorders	486	505	551	537	594	632	638
H	Drug-induced cataract and hearing loss	3	0	2	1	2	2	0
I	Cardiovascular consequences due to drugs	1,401	1,488	1,668	1,609	1,752	1,709	1,693
J	Drug-induced liver disorders	47	50	52	47	53	35	50
K	Toxic liver disease	171	211	198	213	212	270	321
L	Dermatitis due to drugs	1,148	1,181	1,308	1,346	1,407	1,542	1,527
M	Drug-induced immune disorders	82	78	91	85	90	79	87
N	Nephropathy due to drugs	54	62	83	83	73	71	56
T	Complications following injection, immunisation or anaesthesia	1,808	2,028	1,999	1,926	1,830	2,016	1,973
	TOTALS	**7,421**	**8,026**	**8,759**	**8,796**	**9,390**	**9,994**	**10,512**

5.3.4 Medicines which caused emergency hospital admissions due to ADRs

Table 5-4 shows the medicines that were implicated in medicines-related admissions to hospital from 2008/9 to 2014/15. In 2014/15 the most common group of medicines involved in ADRs were systemic agents, which accounted for 23.6% of all ADR emergency admissions where a medicine was recorded. This group includes antineoplastic and immunosuppressant medicines. These medicines have well documented, and sometimes serious side-effects, it would be expected that some patients taking this group of medicines would require hospital admission due to an ADR.

The next most commonly implicated group of medicines in 2014/15 were analgesics, antipyretics and anti-inflammatory drugs (12.6% of ADR-related emergency admissions where a medicine was recorded) followed by medicines primarily affecting the cardiovascular system (11.2% of ADR-related emergency admissions where a medicine was recorded). The analgesic category includes medicines such as aspirin, non-steroidal anti-inflammatory medicines and opioids, which often appear on the lists of medicines that are most likely to cause a medicines-related problem (Howard *et al.*, 2007).

Again, looking at the temporal trends over the study period 2008/9 to 2014/15, the medications that resulted in the greatest increases in emergency hospital admissions were: agents affecting the gastrointestinal system (122.3% increase), hormones and their synthetic substitutes (86.2% increase) and sedatives, hypnotics and anti-anxiety drugs (73.4% increase). The huge increase in emergency admissions coded as secondary to gastrointestinal drugs could be a reflection of the fact that between 2005 and 2015 the number of prescription items dispensed for antisecretory drugs increased by 125.4%, from 26.9 million items to 60.8 million items (Prescribing and Medicines Team HSCIC, 2016).

The only reduction in medicines-related admissions was for topical medicines affecting the skin, mucous membranes, eyes, mouth, throat and teeth, which showed a reduction of 41.3% from 2008/9 to 2014/15.

Table 5-4 Summary of emergency hospital admissions due to ADRs by external cause codes

		2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Y40	Systemic antibiotics	5,394	5,670	6,316	6,707	7,257	7,635	8,132
Y41	Other systemic anti-infectives and anti-parasitics	1,151	1,476	1,510	1,648	1,795	1,817	1,820
Y42	Hormones and their synthetic substitutes and antagonists	3,570	4,237	4,855	5,107	5,901	6,432	6,648
Y43	Primarily systemic agents	11,746	13,669	15,673	16,434	17,028	18,491	19,253
Y44	Agents primarily affecting blood constituents	2,406	2,567	2,784	2,831	3,044	3,317	3,620
Y45	Analgesics, antipyretics and anti-inflammatory drugs	6,536	7,600	8,031	8,520	8,822	9,548	10,242
Y46	Antiepileptics and anti-Parkinsonism drugs	1,157	1,282	1,308	1,460	1,446	1,615	1,686
Y47	Sedatives, hypnotics and anti-anxiety drugs	451	555	528	637	644	796	782
Y48	Anaesthetics and therapeutic gases	256	299	284	310	327	318	400
Y49	Psychotropic drugs, not elsewhere categorised	1,821	2,177	2,259	2,484	2,541	2,697	2,829
Y50	Central nervous system stimulants, not elsewhere classified	56	79	84	96	106	93	87
Y51	Drugs primarily affecting the autonomic nervous system	2,805	3,162	3,287	3,299	3,595	3,765	3,626
Y52	Agents primarily affecting the cardiovascular system	6,555	7,257	7,528	7,852	8,518	8,973	9,142
Y53	Agents primarily affecting the gastrointestinal system	637	773	784	866	973	1,227	1,416
Y54	Agents primarily affecting the water-balance and mineral and uric acid system	4,220	4,739	5,120	5,360	5,966	6,389	6,606
Y55	Agents primarily acting on smooth and skeletal muscle and respiratory system	270	295	316	362	364	368	447
Y56	Topical agent primarily affecting skin and mucous membranes and ophthalmological, otorhinolaryngological and dental drugs	829	863	1053	966	501	495	487
Y57	Other and unspecified drugs and medicaments	2,261	2,587	2,778	2,976	3,293	3,562	3,793
Y58	Bacterial vaccines	139	140	130	151	145	160	166
Y59	Other and unspecified vaccines and biological substance	374	546	395	415	376	465	420
	TOTALS	**52,634**	**59,973**	**65,023**	**68,481**	**72,642**	**78,163**	**81,602**

5.4 Discussion of findings of HES study

This study has shown that ADR-related admissions have increased each year, both in terms of the proportion of total emergency admissions and bed days utilised. This has been found both in this study, and in data published by NHS Digital (NHS Digital, 2017c). The proportion of ADR-related admissions in this study was 1.6% in 2014/15. This compares to 1.1% in the study that was conducted by Wu *et al.*, (2010), on which the current study was based. This result implies that ADR-related emergency hospital admissions are a persistent and increasing problem for the NHS. This study also found that 2% of bed days were utilised treating patients who had experienced an ADR.

It could be argued that the increase in the proportion of hospital admissions due to ADRs is a result of an increase in the number of prescription items issued over the same period. This does not appear to be the case, as the 53.4% increase in emergency admissions due to ADRs between 2008 and 2015 (financial years) outstripped the 28.6% increase in prescription items dispensed (from 842 million to 1,083 million) between 2008 and 2015 (calendar years) (Prescribing and Medicines Team HSCIC, 2016).

Other studies, that used different methods of data collection, found higher rates of ADR-related emergency hospital admissions. A major prospective observational study conducted by Pirmohamed *et al.*, (2004), found 6.5% of emergency admissions were due to an ADR. This higher prevalence would be expected as researchers were specifically able to identify ADR-related admissions in real-time rather than relying on analysing routinely collected data retrospectively.

It could be argued that using routinely collected data, such as HES, would underestimate the true prevalence of ADR-related admissions because it is often difficult to accurately identify that a medicine has been the main cause of a hospital admission; an ADR may be confused with a new symptom or a complication of an existing condition. There are other inherent difficulties in using routinely collected data such as the input of data by a huge number of different organisations and changes in coding practices over time which would lead to variations in the accuracy and quality of the data. There is also no indication of when the ADR may have occurred; it could have been prior to or during the admission.

In this study the medicines which caused most ADR-related emergency admissions were systemic agents (23.6%); analgesics, anti-pyretics and NSAIDs (12.6%); and cardiovascular drugs (11.2%). These were the same medicines found by Wu *et al.*, (2010) to be the main causes of ADR-related emergency admissions with comparable percentages also; systemic agents (19.2%), analgesics (13.3%) and cardiovascular drugs (12.9%). Other studies have also concluded that these medicines are amongst those most commonly implicated in ADR-related hospital admissions (Smith *et al.*, 1997; Roughead *et al.*, 1998; Howard *et al.*, 2003, 2007; Pirmohamed *et al.*, 2004; Kongkaew, Noyce and Ashcroft, 2008; Brvar *et al.*, 2009; Davies *et al.*, 2009; Kongkaew *et al.*, 2013; Pedros *et al.*, 2014).

The consequences of these ADR-related hospital admissions were again comparable between this study and that conducted by Wu *et al.*, (2010), with mental and behavioural disorders due to drugs, complications following injection, immunisation or anaesthesia and cardiovascular consequences due to drugs being the most common manifestations of ADRs (Wu *et al.*, 2010).

This phase of the study has emphasised that medicines-related hospital admissions are still a persistent problem for patients and the NHS as a whole. As discussed earlier in the thesis, some of these medicines-related problems could have been predicted and therefore potentially prevented. Medicines-related problems that result in a hospital admission cause distress to the patients affected, both physiologically and psychologically, as well as higher costs to the NHS through increased length of stay and treatments required. It was estimated that in 2015, avoidable ADR-related hospital admissions cost the NHS £530 million (NICE, 2015b).

All these data showed the 'big picture' in relation to ADR-related hospital admissions, but it is important to consider the burden for the individual patients. Before focussing on how community pharmacy-based medication review could contribute to ameliorating medicines-related hospital admissions, it was important to find out first-hand how a medicines-related admission to hospital affected a cohort of patients and what their experiences of medication review had been.

5.5 Strengths and limitations of the HES study

This study used data from every emergency patient admission to NHS hospitals in England from 2008/9 to 2014/15, which represented a vast dataset. The advantage of using routinely

collected data is that they are collected in a standard way, cleaned, collated and quality assessed. These data have been collected since 1989, so trends can be shown in areas such as emergency hospital admissions (NHS Digital, 2017b).

The limitations of using routinely collected data are that they are collected and entered by so many different people there are bound to be variations in the process of recording the data from each hospital and also missing or inaccurate data. There is the inherent problem of correct identification of an ADR and the subsequent accurate coding as such. Brvar *et al.*, (2009) found that only one patient out of the 30 in their study had their ADR-related hospital admission coded correctly. Over time the ways of recording data may also have changed; it is possible that the increases in ADR-related emergency admissions shown in the current study could reflect an improvement in the identification and recording of ADRs over time. The HES data used in this study only covered England and the situation may be different in other countries such as Wales or Scotland, due to different NHS systems and data recording in place there. The use of HES also means that there is no information about when the ADR occurred, whether that was prior to or during the hospital admission. The data also do not include the source of medicines that patients are taking, so some medicines may have been purchased over the counter rather than prescribed by a doctor.

This phase of the study used only publicly available HES data, meaning that no patient linkage was possible. This means that a patient with more than one FCE covering their single hospital admission could be counted more than once in the dataset. This lack of data linkage also meant that the emergency admissions due to ADRs that were coded with an ICD-10 as a primary diagnosis were not linked to emergency admissions that were also coded with an external or medicine tagged code; these may have been recorded as the secondary or tertiary diagnosis. This again means that a single patient admission could be counted more than once if the primary diagnosis was one of the chosen ICD-10 codes and a subsequent code also recoded the medicine implicated. The data used for this study were not linked to mortality data either, which would have given an insight into the seriousness of the ADRs recorded. It has recently been suggested that avoidable ADRs directly result in 712 deaths and contribute to 1,708 deaths per year in the NHS (Elliott *et al.*, 2018). It was also not possible to confirm whether medicines were definitely the cause of the admissions, the severity of the ADRs, or to deduce whether the ADRs were preventable.

5.6 Future research

If HES data linkage were used, further studies could be conducted to gain a fuller understanding of the burden of ADR-related admissions on the NHS in England. For example, it would be useful to find out whether an ADR-related admission was more likely to occur in someone who has recently been discharged from hospital. If it were possible to combine HES data with GP practice data, it would be beneficial to identify the characteristics of patients that put them at higher risk of an ADR-related hospital admission with regard to factors such as age or comorbidities.

5.7 Summary of the HES study chapter

The results of the analyses of the HES data between 2008/9 and 2014/15 demonstrate that medicines-related admissions to hospital are an increasing problem for the NHS in England. It is therefore vitally important for all HCPs working within the NHS to ensure that everything possible is done to try and reduce the number of ADRs that are occurring.

Community pharmacists have a crucial role in trying to minimise ADRs, whether through patient education, HCP education, prescription monitoring or enhanced support for patients around the time of hospital discharge, which is a high-risk time for patients managing their medicines.

Through the PD-MUR service, community pharmacists can help patients to manage their medicines effectively after discharge, but this is currently an under-utilised service for a number of reasons. The next phase of the study investigated what it was like to be a patient admitted to hospital due to a medicines-related problem and looked for insights from patients into how the MUR service could be improved for their benefit. Investigating these issues from the patient perspective allowed the patients' voice to be heard and their experiences incorporated into the design of the following phases of the study.

6 Patient Interviews

Chapter Overview

This chapter presents the findings of the in-depth, semi-structured interviews that were conducted with patients who had been admitted to hospital with a medicines-related problem. Patients were asked about their experiences of their hospital admission and medication reviews in the community. The chapter starts with a summary of how the patients were identified, the process of consent and being interviewed, through to an analysis of their responses using the technique, interpretative phenomenological analysis (IPA).

6.1 Introduction

This chapter will focus on the patient interviews that were conducted after the analysis of HES data. Figure 6-1 shows where the patient interviews fit into the study as a whole. They are the first part of novel data collection in this study and form the first qualitative stage of the sequential exploratory strategy. As well as providing a unique insight into what it is like to be a patient who has been admitted to hospital because of a medicines-related problem, the results of the patient interviews helped to shape the content of the questionnaire for community pharmacists which was the final quantitative stage of the sequential explanatory strategy.

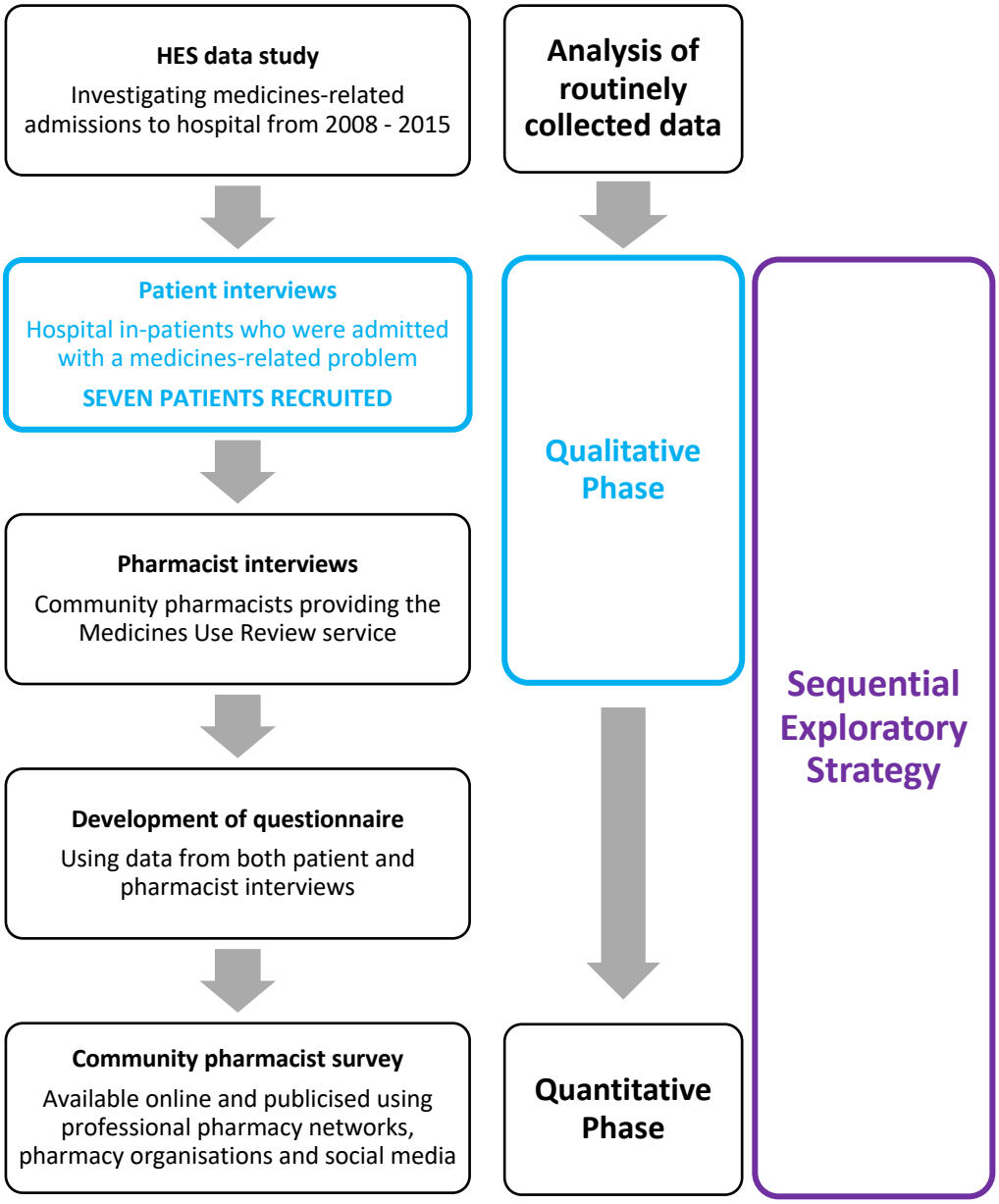


Figure 6-1 Schematic of study – Patient interviews

6.2 Methods for patient interviews

The first qualitative phase of the study focussed on the patient experience. Patients who were admitted to hospital because of a medicines-related problem were interviewed during their in-patient stay. The focus of the interview was their experience of being admitted to hospital and medication reviews in primary care. The plan was to follow them up after their discharge to establish whether a post-discharge medication review had occurred and their opinions and experiences of that process.

Semi-structured interviews were chosen because they allowed the researcher to ask open-ended questions, enabling the participants to give their experiences and opinions in their own words. The principal investigator (PI) was also able to give a face-to-face explanation of the study to participants, which was preferable to only a letter or information sheet; especially for participants with reading difficulties or less well-educated participants (Oppenheim, 1992). Not all participants will be eloquent or insightful and that can affect the data generated during the interview process (Creswell, 2014). Other qualitative techniques such as unstructured interviews, focus groups or ethnography would not produce such personal in-depth accounts which were required for the development of the questionnaire (Oppenheim, 1992; Bryman, 2008). The use of semi-structured interviews was also necessary for the use of IPA as the analytical technique (Smith, 2011).

6.2.1 Ethical considerations for patient interviews

As hospital in-patients were interviewed for this phase of the study it was vitally important that their health and wellbeing was the priority. The PI did not approach any patient before an independent person had introduced the study to them and they had agreed to speak to the PI. This was to ensure that any participation was voluntary and to respect the patient's rights and dignity without pressurising them. Patients were provided with oral and written information about the study, they were given sufficient time to consider the information and informed how to withdraw from the study at a later date if they wished. Anonymity and confidentiality were also maintained throughout their participation in the study.

6.2.2 Sampling process for patient interviews

Patients were recruited from wards at Gloucestershire Royal Hospital (GRH), a district general hospital with 683 beds in South West England, using a purposive sampling method. The PI was employed as a clinical pharmacist by the Trust and therefore had access to patient information as part of their usual role. Other pharmacists and doctors working on the in-patient wards were also encouraged to identify patients who had been admitted with a medicines-related problem. The evidence shows that medicines-related hospital admissions are more prevalent in patients over 65 years old (Garcia-Caballos *et al.*, 2010). These patients were most likely to be found on the admissions ward or the care of the elderly wards, but suitable patients on any wards were also sought. The PI organised a publicity campaign for the study, focussing particularly on staff who worked in areas where suitable patients were most likely to be found. The PI sent periodic emails informing and reminding colleagues about the study, a lunchtime

meeting for pharmacists was arranged to explain the study in more detail and posters were displayed within the pharmacy department and on the elderly care wards (see Appendix D) reminding pharmacists and doctors to look for patients during their ward duties.

Potential participants for this phase of the study were highlighted to the PI, who reviewed the patient's medical notes to assess the patient against the inclusion and exclusion criteria for the study which are detailed in Figure 6-2. Patients who met any of the exclusion criteria were screened out during the initial review of the medical notes, prior to the PI having any contact with them.

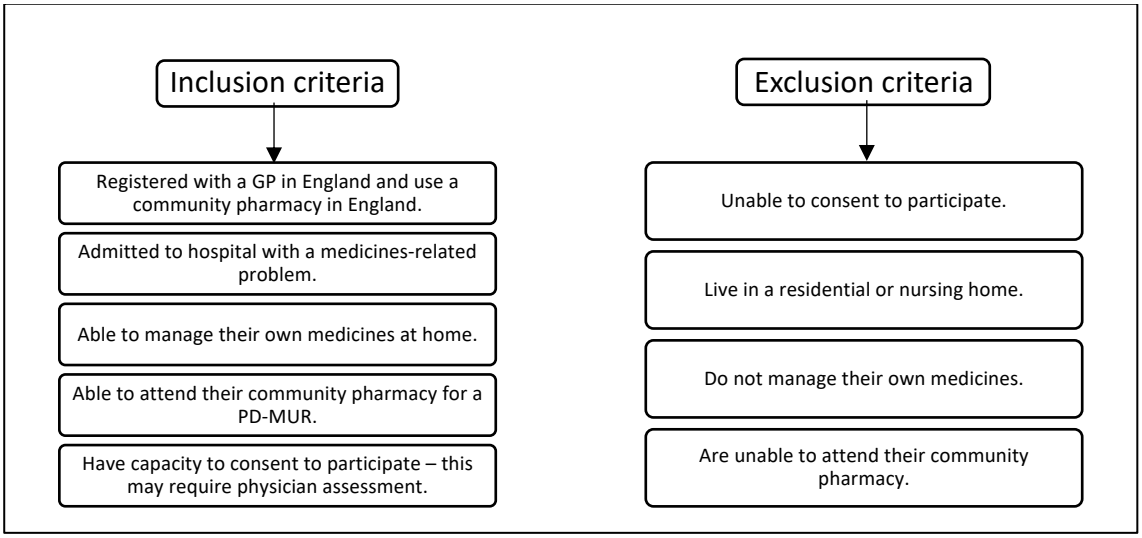


Figure 6-2 Inclusion and exclusion criteria for patient interviews

If the inclusion criteria were met and no exclusion criteria applied, the case was discussed with one of the doctors caring for the patient. This was to ensure that the patient's current admission was definitely medicines-related, the patient was aware that they had been admitted to hospital due to a medicines-related problem and, they had capacity to consent to participate in the study. An independent member of hospital staff, for example the doctor, a nurse or pharmacy technician, then informed the patient about the study, and if the patient agreed, they were then approached by the PI. The PI spoke to the patient to explain the study and gave them a participant information sheet. If time allowed, the patient was given 24 hours to consider their participation in the study before the PI returned to ask whether they gave consent to participate and if so, they were interviewed. If the patient was due to be discharged within the next 24 hours, the study was introduced and, if they were willing to participate, they were consented and interviewed on the same day. If the patient did not have the 24-hour

period to consider whether they wanted to participate in the study, the contact details of the PI and an explanation of how to withdraw from the study was emphasised to the patient at the time of the interview.

The aim was to recruit up to 10 patients for this phase of the study. This was to ensure that a range of different patient types were represented in terms of gender, age, and if possible, ethnicity. The sample size was chosen based on the use of IPA as the technique for analysis of the interview transcripts. This technique uses an in-depth focus on the individual experience and a smaller sample size to gain rich data for this type of analysis (Smith, Flowers and Larkin, 2009).

6.2.3 Interview process for patient interviews

Figure 6-3 shows how recruited patients progressed through the study.

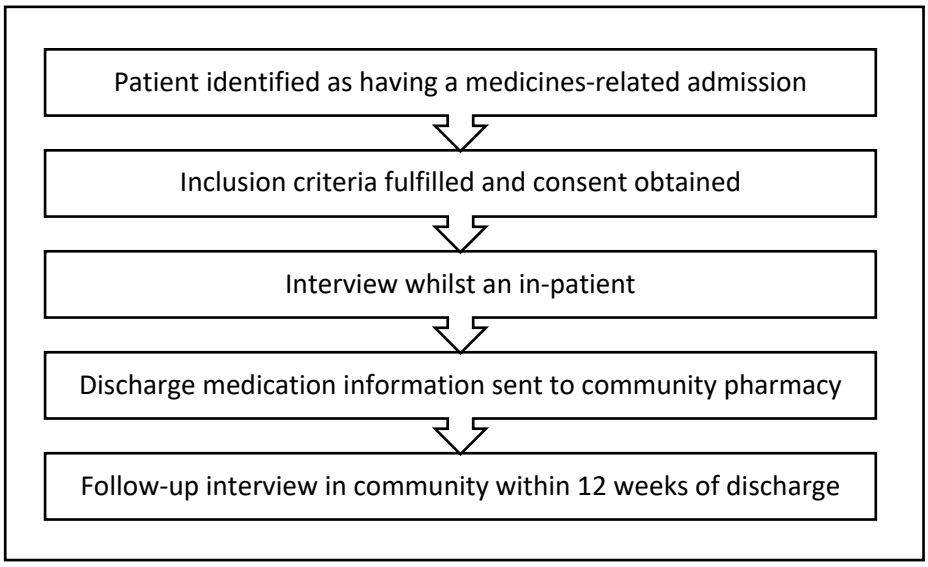


Figure 6-3 Patients' progression through the study

If the patient agreed to participate in the study, they were asked to sign a consent form and were then interviewed, whilst they were still in hospital, about their experiences of having a medicines-related hospital admission, the events leading up to their hospital admission and their opinions of medication reviews. The consent form and topic guide for the patient interviews can be found in Appendix D. The interviews were audio recorded then transcribed verbatim by the PI. The patient was given a £5 High Street voucher as a token of appreciation for taking part in the study.

When patients signed the consent form, they also agreed for the details of their discharge medication to be sent to their local community pharmacist. During the interview the patient was asked for details of their usual community pharmacy and when they were discharged from hospital, the PI sent (by post or fax) a copy of the discharge prescription to the pharmacy with a covering letter. This was designed to act as a prompt for the community pharmacist to conduct a PD-MUR. If the community pharmacy did not conduct MURs, if they had reached their annual MUR quota, or for a variety of other reasons, a PD-MUR may not always take place. This study aimed to reflect a 'real-world' scenario where the community pharmacist had the patient's discharge information from the hospital to encourage them to engage the patient in a PD-MUR, whilst also acknowledging that this is not always possible.

Once the patient had been discharged, the plan was to contact them by telephone, post or email (depending on their preference) up to 12 weeks after their discharge for a follow-up interview about their views and experiences of medication reviews. This was planned whether or not they had had a PD-MUR with their usual community pharmacist. This length of time was chosen as community pharmacists have up to 8 weeks to conduct a PD-MUR and this also allowed the patient time to recover from their hospital admission. Prior to the second interview taking place, the patient needed to sign the second section of the consent form. The plan was for these interviews to again be semi-structured and conducted face-to-face, either at the hospital or another agreed public location e.g. coffee shop. If the patient had to pay a car parking charge to attend the interview this would be reimbursed. If a face-to-face interview was not possible, a telephone interview would be offered as an alternative. The patient would be given a second £5 High Street voucher as a token of appreciation for participating in the second interview. Unfortunately, no patients participated in a second interview; more details about this can be found in section 6.2.8.

After the interview had taken place, the audio-recording was transcribed verbatim by the PI and anonymised. The patients' views remained confidential as per the ethical considerations presented in section 4.3.1; to respect the rights and dignity of individuals and conducting the research with integrity. If a patient wished to withdraw from the study, they were informed that they could do so at any time, without giving a reason, and they were given information about how to do this when they signed the consent form. Their responses would have been removed from the analysis, but no patients requested this.

The audio files were stored in password-protected files on an NHS computer. A file linking the patient's demographic details to their audio recording was kept in a password protected file on an NHS computer. After the completion of the study the audio recordings were deleted without any break in confidentiality. The anonymised transcripts were analysed on a password-protected personal computer.

The interviews were analysed using NVivo software, version 11 (QSR International), using the technique IPA. After the analysis was complete, the anonymised transcripts were stored in password-protected files on a personal computer. Five years after the finish date of the study, they will be deleted without any break in confidentiality.

6.2.4 Analysis of patient interviews - Interpretative Phenomenological analysis (IPA)

6.2.4.1 What is IPA?

Smith, Flowers and Larkin (2009) have summarised IPA as:

> "a qualitative research approach committed to the examination of how people make sense of their major life experiences."

There are three main philosophical threads to this technique: phenomenology, hermeneutics and idiography, and each are discussed in turn below.

6.2.4.2 Phenomenology

The phenomenological underpinning of this technique comes from the work of the philosopher Edmund Husserl, who focussed on the 'careful examination of human experience' (Smith, Flowers and Larkin, 2009). This approach aims to find out how a person perceives an experience rather than trying to categorise an experience into a pre-existing framework. For this technique the researcher must bracket off, as much as possible, their own preconceptions and allow the individual's account to speak for itself (Smith and Shinebourne, 2012; Pietkiewicz and Smith, 2014). This phenomenological stance was expanded on by philosophers that came after Husserl, such as Heidegger, who was concerned with the ways in which individuals make sense of an experience (Smith, Flowers and Larkin, 2009; Smith and Shinebourne, 2012); Merleau-Ponty, who developed the idea that an individual has an 'embodied' relationship with the world and the lived experience of this can never be fully elucidated but must not be ignored (Smith, Flowers and Larkin, 2009); and Satre, who suggested that individuals interpret their experiences dependent on social and personal

relationships with others (Smith, Flowers and Larkin, 2009). These later philosophers all developed Husserl's original stance of the importance of the lived experience and postulate that an individual interprets an experience in the context of their relationship with the world (Smith, Flowers and Larkin, 2009). This lived experience of an individual cannot just be 'obtained' by the researcher. The researcher must engage with the individual and interpret their account of their experience, which is the next strand of IPA; hermeneutics (Smith and Shinebourne, 2012).

6.2.4.3 Hermeneutics

Hermeneutics is derived from the Greek word, hermeneuo, meaning 'to interpret' or 'to make clear' (Pietkiewicz and Smith, 2014). Heidegger, who was a student of Husserl's, was a proponent of hermeneutic phenomenology, whereby there has to be some interpretation of an individual's account of an experience (Smith, Flowers and Larkin, 2009; Smith and Shinebourne, 2012). IPA is concerned with examining a particular experience and the researcher facilitates the interpretation of this experience. This has been described as a 'double hermeneutic' process where the researcher is trying to make sense of an experience that an individual is trying to make sense of (Smith and Shinebourne, 2012).

6.2.4.4 Idiography

Finally, IPA is idiographic, meaning a concern for the detail and depth of the analysis (Smith, Flowers and Larkin, 2009). This means there is a focus on attempting to comprehensively understand what an experience is like for an individual. This is achieved by having a small, purposively-chosen sample to allow a greater depth of interrogation of the individual's account of an experience. Some IPA studies have used single case analyses (Smith, Flowers and Larkin, 2009). Before any generalisations are made about an experience, the particular details of the experience from the individual(s) account(s) are analysed in turn. Generalisations are then tentatively developed whilst maintaining the depth of the individuals' accounts of the experience (Smith and Shinebourne, 2012).

6.2.5 Choice of IPA for this study

6.2.5.1 Why IPA was chosen

An in-depth study, intent on gaining a comprehensive account from patients would add to the knowledge base in this area due to its ideograph focus. Also, from a patient's point of view, having a medicines-related admission to hospital may be a traumatic experience and could

become a significant event in their lives. This topic was therefore suited to a hermeneutic phenomenological approach, where there was an attempt to interpret what this experience was like for them. IPA was particularly suitable for the analysis of the patient interviews in this study because it was anticipated that there may have been a limited number of potential participants. This was because even though medicines-related hospital admissions are relatively common, they can be difficult to categorically identify. Also, there are a lack of data in the published literature about the experiences of patients who have been admitted to hospital with a medicines-related problem. There is a plethora of published literature about medicines-related admissions to hospital (Beijer and de Blaey, 2002; Winterstein *et al.*, 2002; Pirmohamed *et al.*, 2004; Kongkaew, Noyce and Ashcroft, 2008), the medicines implicated (Howard *et al.*, 2007; Brvar *et al.*, 2009; Davies *et al.*, 2010), the scale of the problem and how to reduce the phenomena (Kongkaew *et al.*, 2013; Pedros *et al.*, 2014), but very little about the experiences of the patients involved. The use of IPA in this study aimed to give these patients a voice and attempt to discover how they processed what had happened to them.

6.2.6 How the IPA analysis was conducted

There is not a rigid procedure for conducting an analysis using IPA. Smith, Flowers and Larkin (2009) suggested the following steps but acknowledged that this method could be amended depending on the experience of the researcher and area being studied. The overall process involved analysing each interview transcript individually before all the transcripts were considered together. Table 6-1 shows the stages in the IPA analysis for the current study.

Table 6-1 Stages in IPA analysis (Biggerstaff and Thompson, 2008; Smith, Flowers and Larkin, 2009)

Stage	Task	Rationale/outcomes
1	Initial reading and re-reading of the individual paper interview transcripts; thoughts, observations and reflections noted whilst attempting to 'bracket off' any preconceptions on the part of the researcher.	Researcher became immersed in the data and began to understand the patients' experiences.
2	Descriptive comments noted in left-hand margin of paper transcript.	Collection of descriptive comments focussed on events of experiences of participant.
3	Linguistic comments noted on paper transcript.	Demonstrated use of language to describe their account.
4	Interpretative comments noted in right-hand margin of paper transcript.	Collection of interpretative comments based on what the researcher thought were the underlying meanings of the participant's account.
5	Transcripts uploaded into NVivo.	Electronic transcripts fully annotated with all hand-written comments from paper transcripts. Quotations tagged with themes to facilitate the organisation of the analysis.
6	Interpretative comments arranged into thematic groups using NVivo software.	Using interpretative comments to determine themes that were apparent in each interview.
7	Thematic groups printed out for each interview and grouped into main themes by sticking them on to 'participant theme maps' (see example in Appendix D).	Main themes from each interview established.
8	Integration of the analysis across cases by looking at overarching themes from each individual interview to discover themes that applied to the whole dataset.	Integrated analysis of all patient interviews produced overarching themes. By using NVivo, it was possible for all the participants' quotes relating to each theme to be printed as a list, which helped greatly with the analysis and writing-up.

The development of themes for the individual participants analyses (stage 6) and the integrated analysis (stage 8) could have been done in a variety of different ways. Smith, Flowers and Larkin (2009) suggested two methods:

- typing out a list of themes, then moving them around on the computer screen until related themes were eventually grouped together.
- printing out the full list of themes, cutting them up and moving them around until similar themes were grouped together (the method chosen for the current study).

To establish the themes from the patient interviews, again there were various methods that could be chosen, including:

- looking for and grouping together themes that were similar (this was the method chosen for the current study).
- identifying where a participant appeared to have opinions that contradicted themselves.
- highlighting the number of times a theme appeared in a particular transcript.

(Smith, Flowers and Larkin, 2009).

6.2.7 Recruitment of patients

The aim was to recruit between eight and ten hospital in-patients for this part of the study. Seven patients were finally recruited, and this was for a variety of reasons. Firstly, it was quite difficult to identify which patients had definitely been admitted due to a medicines-related problem. Often a medicine was suspected of causing a particular problem, but on speaking to the doctor caring for the patient, it became clear that there were other factors at play, such as comorbidities that could explain the patient's symptoms. Secondly, the pharmacists at the hospital were asked to identify patients during the course of their normal work. As for all hospitals, in-patient wards are an extremely busy working environment and remembering to identify patients for a study did not rank highly on the list of essential tasks that had to be undertaken during a ward visit. This was echoed in a paper that found that the competing priorities of ward pharmacists hampered recruitment of patients to a PD-MUR study (Ramsbottom, Fitzpatrick and Rutter, 2016). Thirdly, some eligible patients did not wish to participate in the study and fourthly on some occasions the researcher was not able to talk to participants at an appropriate time before they were discharged.

Characteristics of the seven patients recruited can be seen in Table 6-2. This shows that there were a mix of genders (four females, three males) and a range of older ages (between 67 and 88 years) but all participants were of the same ethnicity. The reasons for hospital admission were varied but all signs or symptoms were listed in the Summaries of Product Characteristics (SmPC) as possible undesirable effects for the medicines in question. Most of the undesirable effects were listed as common in the medicine's SmPC, which means they were expected for <1/10 but ≥1/100 of patients taking that particular medicine. No assessment was made as to whether the medicines-related admission was preventable or not.

Table 6-2 Summary of characteristics of hospital in-patients recruited

Patient ID	Age/Sex	Ethnicity	Medicine responsible for admission	Undesirable effect experienced	Frequency of undesirable effect according to SmPC	Prescribing decision
1	86/Female	White British	Buprenorphine patches	Dizziness and vomiting	Very common ≥1/10 (Napp Pharmaceuticals Ltd, 2017)	Stop buprenorphine, continue non-opioid analgesia.
2	88/Female	White British	Ticagrelor	Diarrhoea	Common ≥1/100 but <1/10 (AstraZeneca UK Ltd, 2017)	Continue ticagrelor
3	67/Male	White British	Bisoprolol	Dizziness	Common ≥1/100 but <1/10 (Merck, 2015)	Stop bisoprolol
4	78/Male	White British	Ramipril	Hyperkalaemia	Common ≥1/100 but <1/10 (Sanofi, 2018)	Stop ramipril
5	73/Male	White British	Furosemide	Rash	Rare ≥1/10,000 but <1/1000 (Accord Healthcare Ltd, 2016)	Stop furosemide
6	69/Female	White British	Rivaroxaban	Headache	Common ≥1/100 but <1/10 (Bayer Plc, 2018)	Stop rivaroxaban, restart warfarin
7	84/Female	White British	Furosemide and ramipril	Hyperkalaemia and acute kidney injury (AKI)	Furosemide: Elevations in creatinine and urea = Uncommon ≥1/1000 but <1/100 (Accord Healthcare Ltd, 2016) Ramipril: Hyperkalaemia = Common ≥1/100 but <1/10. Renal impairment = uncommon ≥1/1000 but <1/100 (Sanofi, 2018)	Stop furosemide and ramipril. Ramipril to reviewed at out-patient appointment

6.2.8 Patient referral to community pharmacies and follow-up

Following the in-patient interview, the patients were referred, with their consent, to their regular community pharmacist for a PD-MUR. In all cases, this referral was made by faxing a copy of the discharge medication list and a covering note to the community pharmacy explaining the study and informing them that the patient was eligible for a PD-MUR. The plan was then to contact the patient after eight to twelve weeks for a follow-up interview to find out whether they had participated in a PD-MUR and their experiences of it.

Unfortunately, despite all the discharged patients having a referral to their community pharmacist, no follow-up interviews were conducted. This was for a variety of reasons: two patients were no longer looking after their own medicines; one had died during the admission and one was discharged to a nursing home. The remaining five patients did not get in touch when prompted for the follow-up interview, hence were lost to follow-up.

There are many reasons why this may have happened including; loss of interest in the study, too unwell to participate/housebound, died, no longer eligible to participate e.g. if admitted to residential care, too inconvenient to participate in an interview once discharged or recovered, and too busy. These are all possible reasons, but as the patients were not contactable, it was not possible to confirm the circumstances in each case.

6.3 Results and discussion of the patient interviews

6.3.1 Introduction to the analysis of the patient interviews

The seven patient interviews were analysed using IPA to discover whether there were any overarching themes that could be used to describe the data that had been obtained. The patients gave very rich and sometimes extremely detailed accounts of what had happened to them and their views and experiences of taking medicines. These accounts gave further insight into how they interpreted these experiences and how they planned to move forward with their lives after this event. The analyses of the interviews have considered the patients as a group of individuals who all experienced the same phenomena; a medicines-related admission to hospital, rather than an account of each individual patient's experiences.

6.3.2 Themes from the patient interviews

The analysis of the interviews generated one overarching theme and three subordinate themes which are summarised in Figure 6-4. All the participants' interviews covered the same topic areas and it was interesting to discover that despite their varied views and experiences, overall, what they said could be summarised by these themes. The overarching theme was locus of control and the subordinate themes were health journey and outlook, relationships, and health literacy. The findings and a discussion of each of these themes are presented in the following sections.

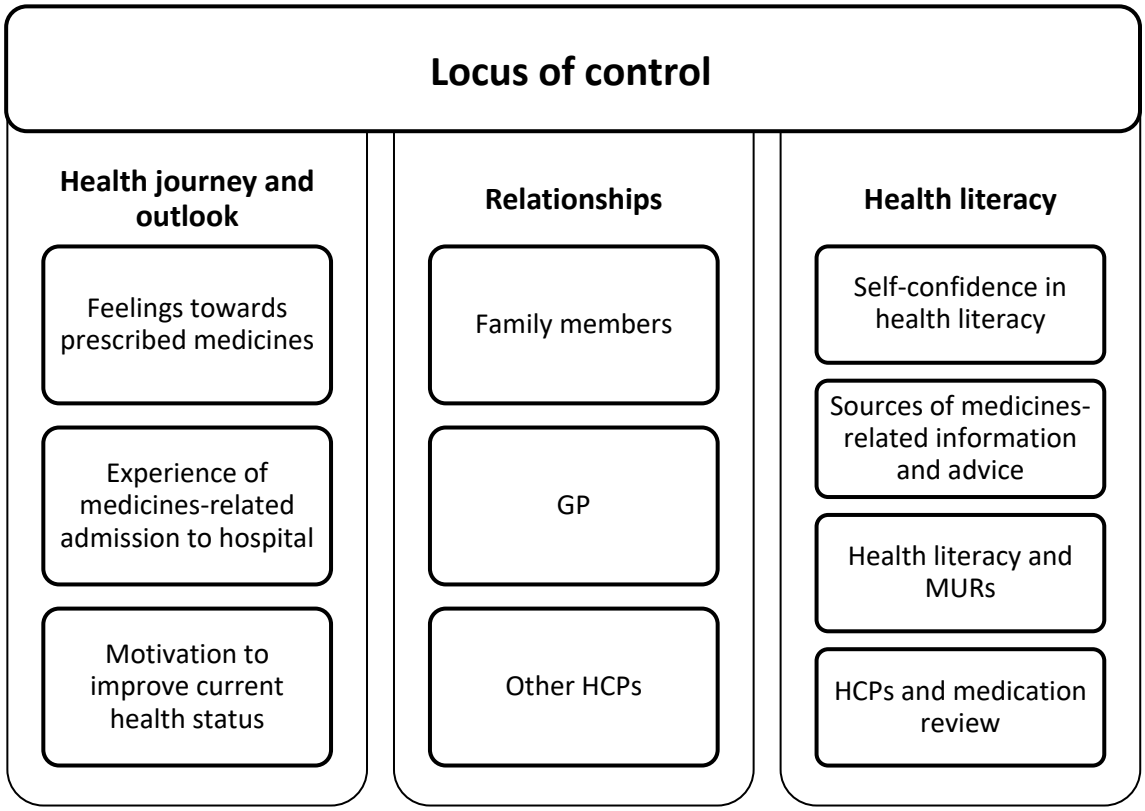


Figure 6-4 Themes from patient interviews

The quotations used in the following sections are annotated, in some circumstances, to indicate the speaker. An annotation of 'I', indicates the interviewer and an annotation 'P' indicates the participant. If there is no annotation, the words are those of the participant.

6.3.3 Overarching theme - Health Locus of control

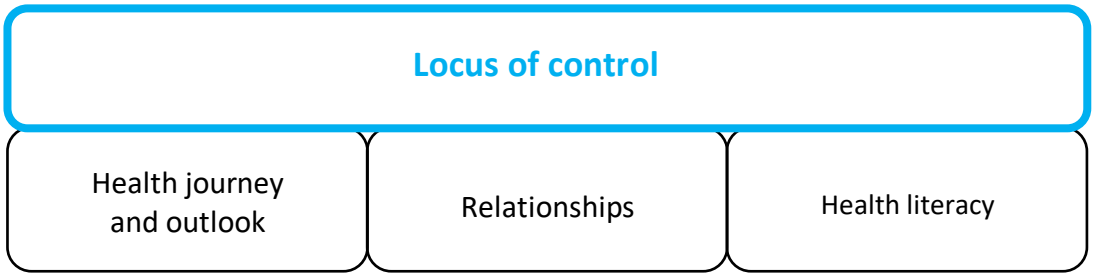


Figure 6-5 Themes from patient interviews: overarching theme - locus of control

The overarching theme to emerge from the patient interviews was around the locus of control. The term control refers to whether a person thinks that they have the ability to affect things that happen in their lives. The locus refers to where the control lies in relation to the person and can therefore be internal or external. This model can be applied to a person's health beliefs and how much control they think they can have over their health outcomes, and is referred to as health locus of control (HLOC) (Wallston and Wallston, 1982). It can be measured using the Multidimensional Health Locus of Control questionnaire (Wallston, Wallston and DeVellis, 1978). An internal health locus of control (I-HLOC) means that a person believes they have control over their health outcomes through their own behaviour. People with an external health locus of control (E-HLOC) feel that other people or things affect their health rather than themselves (Wallston and Wallston, 1982). The term E-HLOC can also be subdivided into: powerful others health locus of control (PO-HLOC), doctors health locus of control (D-HLOC), chance health locus of control (C-HLOC) or God health locus of control (G-HLOC) (Nafradi, Nakamoto and Schulz, 2017).

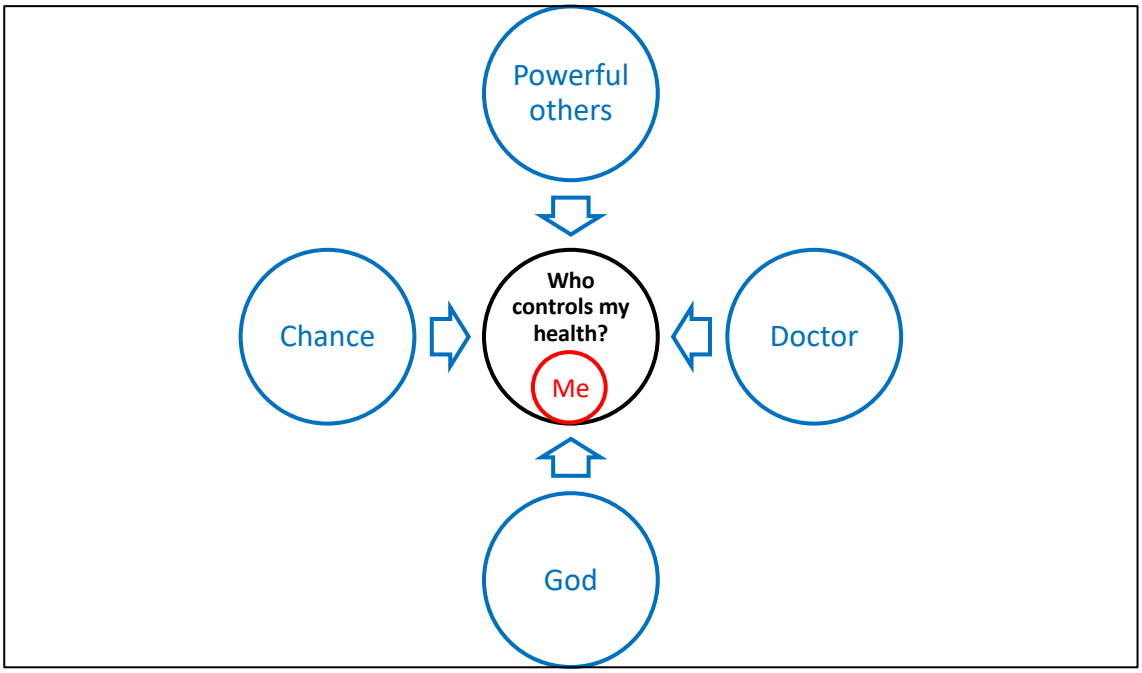


Figure 6-6 Health Locus of control

(Red = internal health locus of control, blue = external health locus of control)

The beliefs that a person holds around HLOC have been found to affect various health behaviours. It has been shown that people with an I-HLOC are more likely to; make healthy lifestyle choice around issues such as smoking, alcohol consumption, exercise and diet (Norman *et al.*, 1998), and are more likely to be adherent to their medicines (Nafradi, Nakamoto and Schulz, 2017).

6.3.3.1 Control over health issues

Some participants had felt in control of their health and had been satisfied with their level of control prior to their hospital admission. They showed gratitude for their previous good health and compared themselves favourably to others by saying they were in good health for their age and acknowledging that they had done 'a good job' of maintaining their health until this point.

> "So, really and truly, I got to be satisfied with what I've got, apart from what's happening now."
>
> Patient Two

> "It's only the second time I've been in hospital in my life…coming up for 79 years."
>
> Patient Four

The current situation they found themselves in was a revelation for some of the patients. They showed desperation with their current situation and as they had been in hospital, they had been able to think about, and reflect upon what had happened to them. One of the participants who displayed an I-HLOC had been in excellent health until recently, they described how they had gone from being active to being unable to stand, and how this had been a shock for them personally:

> "And I'm not using an awful lot of energy in the day, these days…a week before I came into hospital, I was walking half an hour, three-quarters of an hour with my dog. She's an old dog now so she's more interested in sniffing than looking at the landscape. Two kilometres or something. And when I came here one or two people said, 'beware of a shock or two, if you are going to be in there for a week', they said, 'if you don't use any of your muscles for four days, you can't stand up.' Which surprised me, but it proved to be true."
>
> Patient Five

Another of the participants who displayed a PO-HLOC had been unwell for a very long time with back and neck pain. They revealed their desperation with constant pain over a prolonged period of time; they wanted to proactively take control of their situation and had been willing to undergo a high-risk operation, but the surgeon was not prepared to go ahead as the risks were too great.

> "And he said, 'no, I'm not operating'. He said, 'I've only got to slip and she's paralysed…no, no, it isn't worth it.' I wanted to, but he wouldn't let me."
>
> Patient One

They had tried to regain some control of their pain by using opioid patches for analgesia, but this had resulted in the medicines-related admission to hospital.

> "of course, my back…it affects my neck…so they put morphine [sic - buprenorphine] patches on me."
>
> Patient One

One of the other participants with an I-HLOC, described how they thought they should be recovering more quickly after a procedure and sought help because this was not the case. They had contacted the GP who confirmed they were experiencing a medicines-related side effect that was hampering their recovery.

> "And I said, 'this is not right'…and I thought, this isn't right, I should be picking up a bit."
>
> Patient Two

For some participants, the deterioration in their health was accompanied by a lack of control over their current health status. For some participants who had an E-HLOC, they accepted this:

> "I don't worry him (the GP) because I've got nurses coming in every morning…they take messages back to him. And then if I need to see the doctor, then he comes because it's only down across the field."
>
> Patient Seven

> "The thing is, I'm housebound…he (the GP) can get to me but I can't go to him."
>
> Patient One

For others, this shift from their usual I-HLOC to an E-HLOC proved difficult. They did not like being reliant on others to resolve their health-related problems and preferred to seek help independently.

> "I want to go home. Back to me own home…I've looked after my own home for years…and I looked after my husband for 5 or 6 years; he had Alzheimer's. I looked after him and I thought, I must try and pick up."
>
> Patient Two

Despite this lack of control and desperation with the current situation, the participants showed incredible resilience and motivation to improve their health status. The majority of patients expressed hope for the future in terms of improvements in their health and returning to their previous level of functioning.

6.3.3.2 Discussion of control over health issues

As mentioned above, an unexpected change from an I-HLOC to an E-HLOC can be disturbing for some patients. This outcome was also found in a study which interviewed 77 residents in assisted living in the US. The authors illustrated that when older people actively entrusted someone else to make decisions for them, the participants reported a positive response. If the control for making decisions had been taken from the older person, this elicited a negative reaction (Morgan and Brazda, 2013). For patients who previously had an I-HLOC, regaining it in future would be their aim.

In the UK, the Government is also keen to allow patients to be more in control and actively involved in decision-making, which represents a focus on promoting an I-HLOC. The 2010 White paper, Equity and Excellence: Liberating the NHS, stated that shared-decision making would become the norm with the strapline: no decision about me without me (Department of Health, 2010a). It has been shown that involving patients in shared-decision making about their health improves patient knowledge, adherence, health outcomes and satisfaction (Bechel, Myers and Smith, 2000; Stevenson *et al.*, 2004). Even though this is the goal, it may not be possible for all patients, for some, support from others may be both welcome and necessary.

Some respondents to the 2010 White Paper also thought that shared-decision making would not be possible for everyone, especially those individuals who required extra support. The Royal College of General Practitioners stated that:

> "There is a risk that shared decision-making will have a distorting effect on consultation time spent with patients – put simply, the more articulate, better educated and more assertive patients may be encouraged to demand more time with their GP to discuss options – whilst those who are less literate but who have greater needs may lose out."
>
> (Department of Health, 2012)

This view highlighted that shared-decision making must be individualised for each patient and some patients may need to involve others if they have delegated control to them. This overarching theme affected patients' attitudes and experiences relating to all the subthemes that are presented and discussed in the following sections.

6.3.4 First subordinate theme - Health journey and outlook

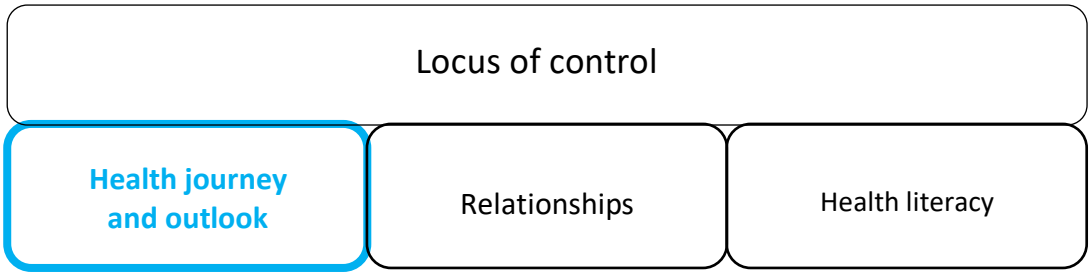


Figure 6-7 Themes from patient interviews: first subordinate theme- health journey and outlook

The first subordinate theme that emerged from the patient interviews was around the topic of health journey and outlook. Participants were asked about their experience of taking medicines, what had brought them into hospital, and what it had been like to be admitted to hospital with a medicines-related problem. There were three sub-themes of the health journey and outlook area which unfolded during the analysis of the interviews: feelings towards prescribed medicines, experiences of a medicines-related problem and motivation to improve current health status. They are explored in the following sections.

6.3.4.1 Attitudes towards taking medicines

The participants were asked how they felt about having to take medicines. For some, it was about the acceptance of taking something that was going to do them good, for others it was something they had become used to over a long period of time and had reluctantly accepted. Patients seemed to use medicine-taking as a surrogate acknowledgement that they were unwell and that was difficult for them to accept. The routine of having to take medicines for a long period of time had gradually helped them to come to terms with their health problems. For some participants, when they were asked about their feelings towards taking prescribed medicines, they were internally conflicted; on one hand they understood the importance of medicine taking and complied but on the other hand they did not like it.

> I: "How do you feel about having to take medicines?"
> P: "Not very good, but I suppose I've had to do it for years. Years and years ago there wasn't what's going on today."
>
> Patient Two

> I: "Thinking now more generally about medicines, how do you feel about having to take medicines?"
> P: "I'm used to it, I don't like it, but I'm used to it. And five in the morning, no four in the morning and four at night and then paracetamol so you get used to it."
>
> Patient Six

Some of the participants were accepting of taking medicines 'as long as it did them good.' They seemed to concede that the medicines were there to treat their medical conditions and therefore taking them was part and parcel of maintaining their health.

> "In the mornings, I was taking…I was taking eight, eight tablets in the morning look. Might as well bloody crush them and put them in a bloody omelette, there were that many. You know, they have done me good. Me heart's ticker…heart's ticker is no good anyway. If I don't take them, I'll be bad again, like [sic]."
> I: "…and how do you feel about having to take medicines?"
> P: "Umm, if it do me good…I don't mind."
>
> Patient Three

> I: "…and how do you feel about having to take medicines?"
> P: "I don't mind taking them if they make me all right."
>
> Patient Seven

One participant described how they had tried to avoid taking prescribed medicines for a long period of time by concentrating on a healthy diet, but eventually they had to accept that medicines were necessary.

> I: "Now thinking about medicines generally. Are you happy to take medicines?...How do you feel?"
> P: "I don't mind taking them. For years I had all the health food…so I used to go there. They said it wasn't doing any good."
>
> Patient One

How the participants spoke about taking prescribed medicines gave an insight into their underlying feelings, not just about the medicines themselves but also their diagnosed conditions. It is perhaps unsurprising that previously healthy people displayed some reluctance to take medicines, which could reveal a hidden denial of the existence of their health problems. Others took medicines to improve their health, despite their dislike of having to take them. These different views help to understand how patients rationalise their medicine-taking.

6.3.4.2 Discussion of attitudes to taking medicines

These different mechanisms for rationalising medicine-taking appeared to be linked to the HLOC of the participants. The group with an E-HLOC seemed to be more accepting of medicine-taking, they had faith that the medicines would have a positive effect on their health and appreciated their GPs' efforts to prescribe medicines that would benefit them. They were less health literate, did not want lots of information about their medicines and were more reliant on family members when making health and medicines-related decisions. These characteristics were echoed in a systematic review and meta-synthesis of 34 qualitative studies that focussed on medication-related burden and patients' lived experience with medicines (Mohammed, Moles and Chen, 2016). The study reported that patients mainly had positive attitudes towards taking prescribed medicines. This was due to their trust in HCPs, having previous positive experiences when taking medicines, and hope that the medicine would have the desired outcome. These attitudes motivated individuals to persist in taking their medicines (Mohammed, Moles and Chen, 2016).

The I-HLOC group seemed to be more questioning; they wanted information about their medicines and thinking about taking medicines seemed to trigger more negative feelings and attitudes around overall health and illness. This alternative view was also seen in a published synthesis of qualitative studies concerning medicine taking which found that people 'disliked depending on medicines' (Pound *et al.*, 2005). Studies of patients interviewed in primary care in England about attitudes to medicine-taking have also found that some patients prefer not to take medicines if they can avoid it (Britten, 1994; Benson and Britten, 2002). A study of 544 patients who were surveyed in general practice in London, found that 86% agreed with the statement 'I prefer not to take any medicine if I can avoid it' (Britten, Ukoumunne and Boulton, 2002). This was also echoed in a study of 50 patients interviewed in the community about medicine-taking by Dowell and Hudson (1997). The authors argued that medicine-taking was associated with being ill and if patients did not accept that, they were unlikely to take medicines for their illnesses (Dowell and Hudson, 1997). This sentiment was also displayed by another patient who told a medicines-adherence researcher that 'medications remind people that they're sick. Who wants to be sick?' (Rosenbaum, 2015). This author also found that some people associated medicine-taking with weakness and they did not like being associated with a 'sick identity' (Rosenbaum, 2015). For the patients with long-standing health problems in the current study, time seemed to have helped them to accept that medicine-taking was necessary and perhaps this equated to an acceptance of their health-problems.

The study by Dowell and Hudson (1997) proposed that three types of medicines user exist. The first were those who passively accepted medicines and took them as the doctor had prescribed, the second actively took medicines but took them as they wanted, and the third rejected medicines altogether (Dowell and Hudson, 1997). HCPs need to appreciate that when they prescribe and dispense medicines, the patient's underlying attitudes to medicine-taking will have perhaps the greatest effect on effectiveness.

6.3.4.3 Experience of a medicines-related admission to hospital

For all the participants, their admission to hospital with a medicines-related problem was a negative and, in some cases, an extremely traumatic experience for them. They used very emotive language when describing their experiences. In the following quotes from the participants, the strength of their feelings is indicated linguistically by the use of certain words and phrases; these are indicated in bold text.

> "I went to bed, my bed turned around. My furniture was coming off the wall. ***Terrible***. And I'm there on my own I'm ***frightened***."
>
> Patient One

> "It's been like a ***roller-coaster***. In, out, in, out."
>
> I: "I don't want to go through all this again, you know. Backwards and forwards. Thinking I'm going to get better and then having to come back to hospital."
> I: "How do you feel about it all?"
> P: "***Fed up***."
>
> Patient Two

> "…they got mixed up, they were giving me a tablet that made me feel really giddy look…And all the room had gone to jelly, you know what I mean, you know wobbly, wobbly…***terrible***, I'm better now though."
>
> Patient Three

> "So, I've been in ***hell*** with pain"
>
> Patient Five

> "I couldn't stand the pain anymore. It was ***horrific***…it was ***constant***…I mean I've had headaches but that was more than a headache. ***It really was bad***."
>
> Patient Six

The other participants were not aware of why they had been admitted to hospital. Participants four and seven had both been admitted with hyperkalaemia and were not able to convey their feelings about their medicines-related admission.

None of the participants appeared to blame the prescriber for the adverse event, although one participant appeared to blame themselves. This was because they had gone to the GP to instigate the change in medication; the GP had actioned the change but had been reluctant to do so.

> "I just stopped my warfarin and took that (rivaroxaban). Worst thing I ever done [sic]."
>
> Patient Six

These accounts help us to understand the effect of a medicines-related admission on a person. Even though the ultimate aim of the admission was to resolve the medicines-related problem, the whole experience was extremely distressing. It is therefore vitally important to try and avoid medicines-related admissions to hospital whenever possible to prevent psychological distress.

6.3.4.4 Discussion of experience of medicines-related admission to hospital

Unsurprisingly, all the patients interviewed described their medicines-related admission to hospital in negative terms and used very emotive language to do so. A systematic review of medication-related burden and patients' experiences of taking medicines also examined how patients described experiencing an ADE (Mohammed, Moles and Chen, 2016). ADEs were described as one of the most difficult features of medicines taking. A wide range of ADEs were reported in the included studies and patients revealed emotional distress about the ADE and anxiety about recurrence (Mohammed, Moles and Chen, 2016). In a similar study to the current one, 15 hospital in-patients in England were interviewed about their ADR-related hospital admission. The authors highlighted the negative emotional impact of this event for patients, who described feelings of disbelief, anger, fear, frustration and isolation (Lorimer, Cox and Langford, 2011).

Due to the negative impact on patients, it is therefore vitally important to minimise medicines-related admissions to hospital. The NICE guidelines on Medicines Optimisation (NICE, 2015c) detail several ways that HCPs and organisations can learn from medication-related safety

incidents; better identification of medication-related events, enhanced reporting, adherence to national medication-related guidelines, education and training of HCPs and using screening tools to identify patients at high-risk of medication-related ADEs. Although it would be impossible to eliminate all medicines-related hospital admissions, adoption of these principles would help to identify patients at risk and reduce preventable admissions.

6.3.4.5 Motivation to improve current health status

All participants, without exception, expressed a desire to improve their health following on from the acute medicines-related problem that had brought them into hospital. Some of the participants talked about what they had been able to do before the admission and showed pride in the amount of physical activity they had been capable of.

> "And I'm quite active…well, like I said, I go kickboxing every Friday with me grandson until…this. Yeah, he's got his own club so…I keep quite active."
>
> Patient Four

Even during the medicines-related admission, one of the participants described how they tried to think positively and were keen to maximise their level of mobility to ensure that they were ready to go home. This suggested that the participant wanted to get better in order that they would be able to manage to look after themselves at home.

> "...they were the ones to take me to the toilet, I couldn't walk, look, it was so awful I couldn't get out…but it was alright…and I got right to the door and then I was thinking 'I've got to do this, I've got to do this'…"
>
> Patient One

The participants appeared to be using their mental strength and positive attitude to try and push themselves to improve physically and get back to normality. Maybe this also showed an underlying fear that their current illness could prevent them getting back to their baseline level of health or mobility and the consequences of this could be difficult for them to contemplate; for example, an admission to a residential home or requiring carers.

This section has shown that the health status of an individual is a complex meeting of both the physical and mental aspects of a person's health. Participants were interviewed during a distressing period of their lives and although they described their hospital admission in wholly negative terms, they were eager to return home and to their previous level of health. How a person talks about their health status can also reveal other more deeply hidden aspects of

their hopes and fears for the future. In these instances, participants often showed their underlying fears focussed on their loss of control when making health-related and more general decisions, and their attitudes to taking prescribed medicines.

6.3.4.6 Discussion of motivation to improve function after a medicines-related hospital admission

Hospital admissions in older people have been associated with 'deconditioning', a term which covers a whole host of signs and symptoms including reduced bone mass, muscle strength and mobility, increased dependence, confusion and demotivation. It has been suggested that 're-conditioning' can take twice as long as 'deconditioning' (Arora, 2016). This 'deconditioning' process can occur in patients who have been admitted to hospital with a medicines-related problem and was described by one of the participants in this study.

The desire of patients to return to their previous level of functioning is completely understandable and was raised by several of the participants in the current study. The motivation of patients to get back to their normal level of functioning demonstrated positive aspirations for the future and by completing activities of daily living (ADLs) independently during and after their admission they hoped to be able to achieve and regain some control over their health.

6.3.5 Second subordinate theme – Relationships

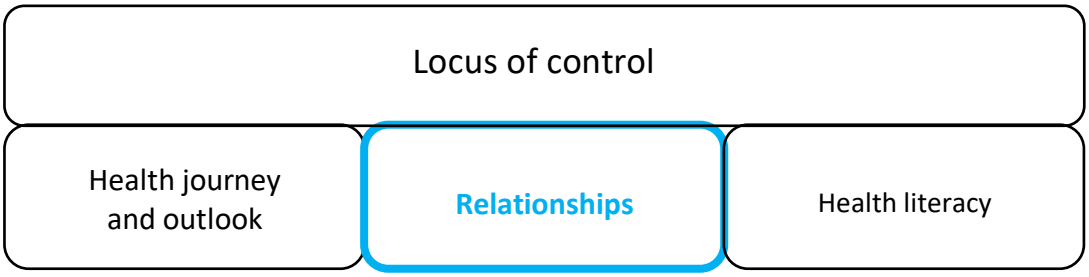


Figure 6-8 Themes from patient interviews: second subordinate theme - relationships

The second sub-ordinate theme was relationships. There were a number of different and valued relationships that the participants described during their interviews. The main ones involved relationships with their GP, other HCPs (both qualified and non-qualified) and their families. The utility of these relationships to the patient depended on various factors such as accessibility to the individuals, trust and how they viewed that individual's role in their health-making decisions. Not all these relationships were described in positive terms by the participants and there was perhaps some reluctance to rely on others, but the current health status of the participant meant they had little choice.

Most of the participants spoke very highly of their GP and underlined the pivotal role of the GP in their health. Some participants also spoke very eloquently about why they would choose one HCP over another in various situations.

6.3.5.1 Relationships with family members

Several of the participants expressed that they had very good relationships with their family members, which included spouses, children and grandchildren. These relatives had helped them when they were faced with a health or medicines-related problem. Several participants had been ill for some time prior to their current admission and had experienced multiple hospital admissions in a short space of time. The reduction in their physical capability had meant that they had become more reliant on their families and had lost some of their previous autonomy around making health-related decisions. The participants placed huge trust in their families to help them make the right decisions, such as when to seek help for a medical problem. This was done either as a joint decision between the participant and the family member, or the family member made the decision on behalf of the participant.

> I: "Did you go to your GP or…?"
> P: "No, no, I didn't bother…and I came in here (the hospital) to visit my

> wife...and I told her about it…and she know about it [sic], that I'm feeling giddy. And she said we better go to A&E, so I went there and came in here (the ward) last night."
>
> Patient Three

> P: "And during the night I woke up with this terrible pain…so she (patient's daughter) gave me this tablet and I must have gone off to sleep for about an hour. And I woke up again with pain…and called her and I said '(daughter's name), I've got such a terrible pain in my chest, you must help me.' And she said, 'I'm phoning the paramedics'."
>
> Patient Two

Another of the participants let their wife deal with any medicines-related information or health-related queries.

> P: "The misses reads everything, mind you."
> I: "And would she read those leaflets about your medicines as well?"
> P: "Yeah, she reads everything…I call her nurse Nightingale!"
>
> Patient Four

For one of the participants, their family member acted in a more impartial, supportive capacity which involved discussing the patient's situation and helping them to come to a decision about the best course of action. This was because the participant's daughter was highly educated, and the participant trusted her ability to make a wise decision.

> I: "Would you go to anyone else for advice about your medicines at all? Or would you tend to just discuss that sort of thing with your GP? "
> P: "I would go to someone I trust…my GP…"
> I: "So your GP, and anyone else?"
> P: "My daughter…my daughter's background is biochemistry…oncology."
> (patient goes on to describe how their daughter has a PhD).
>
> Patient Five

Another of the participants, described how they would rely on their family for practical help but would not ask them about medicines-related issues. Perhaps they did not see this as their role and preferred to keep the family and health advocate roles separate.

> I: "Would you ask your daughters for advice about tablets?"
> P: "No, no."
>
> Patient One

One participant did say that their family would give their opinions whether or not they had been solicited, but they did not seem to mind this.

> I: "…your son and daughter, would you think of asking them for advice about tablets or medicines?"
> P: "Well, they tell me anyway."
> I: "So, they tell you whether you ask them or not?"
> P: "Yeah. They're good."
>
> Patient Seven

This high-level of trust in family members is, in some ways unsurprising, as most family members would be keen to ensure that their relative gets the best possible care at the right time. For the participants in the current study, this input from their family members was either purely supportive to help them make the right decisions or it was more prescriptive, in that the family member made decisions on the participant's behalf. Again, this could be symptomatic of a loss of control for the participant.

6.3.5.2 Discussion of relationships with family members

Some of the patients in this study relied heavily on other family members to support them with the practical aspects of taking medicines and also when making health and medicines-related decisions. This was generally a mutually agreeable arrangement. Mohammed, Moles and Chen (2016), in their systematic review of patients' experiences of medication-related burden, found that partners, family members and friends all appeared to influence patients' beliefs about medicines and this also had an impact on how people behaved towards medicines-use.

Furthermore, a systematic review of 30 studies on the effect of family behaviours on health outcomes showed that patients experienced better outcomes if their families were cohesive, encouraged self-reliance and responded to symptoms of disease. Patients had poorer outcomes if their families displayed signs of being overprotective, controlling or critical (Rosland, Heisler and Piette, 2012). This review demonstrated how a supportive family network can be beneficial for patients.

6.3.5.3 Relationships with GPs

As expected, participants rated their GPs very highly and trusted their decision-making and judgement with regard to their health. Without prompting, several of the participants talked

about the loss of a well-trusted GP who they had built up a long-term relationship with. They expressed this almost as a grief at losing someone who knew them well. For some of the participants there had been insufficient time to develop that type of relationship with their new GP.

> "I used to have a lovely doctor but, umm, he up and went...he was a lovely doctor, very good to me and my husband…actually I've not met this new doctor…the majority of the doctors up there now, bar Dr (name), they've retired."
>
> Patient Two

> "Well, my doctors, my doctors where I go now, you're not guaranteed what doctor you're gonna see from day to day…well you might see one doctor one time, then a different doctor another time like."
>
> Patient Three

The participants also perceived that their GP was busy and felt that this impacted on their care. When participants were asked about medication reviews with their GP, some felt that their GP was too busy to provide that service. They sensed that GPs dealt with the immediate problems resulting in a quick consultation. This was interpreted by some patients as the GP being too busy, but another connotation could be that the GP does not care enough about them or their particular situation. This could account for participants also relying heavily on other HCPs or family members

> I: "Have they (the GP) ever had a sit down and had a review, where they've gone through everything, all your medicines with you?"
> P: "No…too busy for that!"
>
> Patient Six

> I: "When you were in last time did anyone give you any information about your tablets that you were going home on?"
> P: "Nah…they just give me them."
> I: "And how about from your GP…do they normally give you any information when they prescribe things?"
> P: "No, no…don't tell me nothing. Just give our (name)…and he'll bugger off and that's it."
>
> Patient Three

This perception of busyness also applied to the hospital consultants.

> "consultants don't have much time to err…hang around and talk about actually what it is they are actually talking about. They have always got somewhere else to go or someone else to see."
>
> Patient Five

Some patients put their complete faith in their GP with regard to health-related decisions and the prescribing of medicines. They did not want to know anything about their prescribed medicines such as the indication or what side-effects to monitor for. Interestingly, this group of patients all expressed the same opinion about medicines taking; they were happy to take a medicine "as long as it did them good". They expected the medicine to resolve their symptoms and did not feel the need to know any more about it. This demonstrated a completely trusting, deferent, paternalistic patient-GP relationship. For three of the participants this appeared to be related to their health literacy, which will be discussed in section 6.5.6.6.

> I: "You just take what the doctor has prescribed, or would you like to know more?"
> P: "I just take what's given to me. As long as it does me good…as long as it does me good. They know what they are doing…that's their job look."
>
> Patient Two

> I: "And how much information would you like about those changes? Would you like someone to go through and explain them all?"
> P: "No, it doesn't bother me…just told me they're changing me medicines [sic], that's it…and as long as it's doing me good, I don't care."
>
> Patient Four

> I: "Now thinking a little bit about medicines in general, who would you go to, if you thought you might have a problem, or thought you wanted to know a bit more about one of your medicines?" Who would you go and ask for advice?"
> P: "Oh, my doctor...well, if he doesn't know what's going on, who do? [sic]"
>
> Patient Four

> P: "I don't know why I came in…no. My doctor just says I want you to go in hospital, like that."
> I: "And you came because he's asked you to come in?"
> P: "Yes."
>
> Patient Seven

Other patients were more questioning of decisions made by doctors and the information they were given about their medicines or health. They understood that doctors may have different

opinions about their treatment and that treatment decisions could change depending on the information available, and they accepted this.

> "It's a series of ups and downs with doctors and it's not quite…what's the word…not fiddle…but they change their mind depending on the latest evidence."
>
> Patient Five

This trust of the participants in their GP is not at all surprising given that in the most recent GP Patient Survey (IPSOS Mori Social Research Institute, 2017), 91.9% of patients reported having trust and confidence in their GP. There is more about the patient-GP relationship specifically related to MURs in section 6.3.6.8.

6.3.5.4 Discussion of relationships with GPs

A literature review published on the topic of medical decision-making found that opinions varied considerably regarding whether doctors should involve patients in the decision-making process. Shared decision-making is often suggested as a panacea, but this is not true for all situations. Rather, some patients, as in this study, prefer to defer treatment decisions to their doctor, representing a more paternalistic patient-GP relationship. A study of 479 patients consulting their GPs in London found that 45% of patients wanted their GP to be the main or only decision maker regarding their care and only 16% wanted to be the main or only decision-maker themselves (Cox *et al.*, 2007). GPs correctly assessed the desired level of patients' involvement in decision-making in just 32% of cases (Cox *et al.*, 2007), which shows how difficult it can be for HCPs to determine the level of involvement patients would like.

Doctors appreciate that all patients are different but they need to assess the preferences of the patient, and potentially their families, so that they can offer the chance to participate in shared-decision making for those patients who desire it (Rodriguez-Osorio and Dominguez-Cherit, 2008). These differing patient preferences were found in this current study and other studies conducted in England. A qualitative study of patients in the community in North West England reported that there was an inseparable connection between doctors and the medicines they prescribed. Some patients put all their trust in their doctor, which did lead to some feelings of powerlessness, whilst other patients were more questioning. Again, there were different preferences for having additional information, with some patients seeking it and others avoiding it. Very few patients felt able to discuss their concerns about medicines

with their doctor and cited lack of time, language (use of complex medical terms) and lack of experience for this (Krska *et al.*, 2013).

Even though shared-decision making is advocated in practice, HCPs and, in particular, doctors need to assess the quantity and depth of information that a patient requires. This is much easier for GPs who know their patients well and have had time to build up a trusting relationship with them. When the sustained GP-patient relationship is not present it is much more difficult for the GP to assess the level of involvement the patient wants in decision-making and for the patient to be satisfied with the outcome of the consultation.

The patient-GP relationship is vitally important for both patients and also GPs and varies significantly depending on the individuals and how well they know one another. In the 2017 GP patient survey, 46.2% of patients had a GP that they preferred to see (IPSOS Mori Social Research Institute, 2017). A postal questionnaire sent to patients in one county in England found that being able to see a GP who was familiar to them, knew about their past medical problems and understood them was more important than being able to get the most convenient appointment (Kearley, Freeman and Heath, 2001). This was echoed by some of the participants in this current study who were missing a GP they had come to know over a prolonged period of time.

6.3.5.5 Relationships with HCPs

Participants also described good relationships with various trained and untrained HCPs involved in their care. This group included practice nurses, employed carers and community pharmacists. It appeared that often the decision to consult a particular HCP was based on their accessibility and whether they had a trusting interpersonal relationship with them.

One participant had been almost housebound recently and carers had been attending on a daily basis. They had been asking the carers about their medicines even though, in this geographical area, they were not trained in that respect. As the patient was in frequent contact with the carers and had a trusting relationship with them, they felt that the carers would be able to offer appropriate advice.

> I: "Who would you normally ask for advice about your tablets? Who would you normally go to if you had a question?"
> P: "Oh, my own doctor…or the carer that comes round…they're very good, very good."
>
> Patient One

For another of the patients, it was the district nurses who provided this accessible link to health-related information and advice.

> "I've got nurses coming in every morning…they take messages back to him (the GP). And then if I need to see the doctor, then he comes because it's only down across the field."
>
> Patient Seven

The one participant who had previously participated in a MUR with their community pharmacist reported that they would contact their community pharmacist first if they had a query about their medicines. They also reported that on certain occasions when they had consulted their doctor, they had not been satisfied with the outcome of the consultation.

> I: "In terms of getting information about your medicines, if you have a query, who would you go to in the first instance? Who would you ask?"
> P: "I'd go to the chemist…I would, if I was a bit worried about any…a certain medicine, I would go to the chemist…it's easier to go and ask your chemist first rather than wait…for the appointment to see the doctor. And sometimes you don't always get a real satisfactory answer off the doctor…I shouldn't have said it! You shouldn't say it, should you, but, umm, I think sometimes you think oh, that was a waste of time."
>
> Patient Three

Other participants also reported they would ask their community pharmacist if they had any medicines-related queries.

> I" "Who do you think would be the best person to give you advice about medicines?"
> P: (Pause to think) "Well I'm gonna say my chemist…he's good, he'll explain things to you…and tell you."
>
> Patient One

> I: "Who do you think would give the best information and advice about your medicines?"
> P: "I think the chemist meself [sic]…I mean, with all the drugs they're dealing with all the time they've got to be well up on their information on that…I think the chemist, they're the best people to go and see."
>
> Patient Four

> I: "Who would you go to, to ask for advice about anything to do with the tablets and medications that you're taking?"
> P: "I'd phone the pharmacist…they're pretty good. They're usually pretty good, aren't they? They know straight away, or they'll look it up for you."
>
> Patient Six

The reliance of the participants on these other HCPs may reflect the difficulty they have had accessing their GP in a timely manner in the past. This means they have had to devise different strategies to get the information they require to help them make health or medicines-related decisions. For some participants this means they will use their preferred HCP, but for others the HCP they use will represent a compromise that is necessary due to their health status or accessibility.

The preferences for different HCPs demonstrated a complex interplay between trust, accessibility, power, and position of the HCP in the medical hierarchy. When participants reported that they would consult their pharmacist about medicines-related queries, there may have been an element of social desirability bias. This is where participants respond in a manner that would be judged favourably by others; for example, in this case by telling the PI what they thought were the 'right' answers or those that the PI wanted to hear as they were aware the PI was also a pharmacist.

6.3.5.6 Discussion of relationships with different HCPs

As already mentioned in 6.5.5.3, patient trust in GPs is high. This is also the case for nurses as 84.5% of patients had confidence and trust in the last nurse they saw (IPSOS Mori Social Research Institute, 2017). Trust in pharmacists is also high with 87% of a sample of 1160 members of the general public saying that they trusted health advice from pharmacists a great deal or a fair amount (IPSOS Public Affairs, 2015). The same percentage of people, 87%, also stated they were satisfied or very satisfied with the service they received from pharmacists in a survey conducted for the veterinary profession in 2015 (Vet Futures, 2015). This was the highest level of satisfaction of all of the professionals listed which included, opticians, dentists,

vets, GPs, solicitors and accountants (Vet Futures, 2015). This shows that the qualified HCPs that patients are most likely to consult about medicines-related queries are all highly trusted.

Who a person consults about a medicines-related issue is not only determined by who they trust most but is a complex interplay of many factors which also include accessibility and the power to effect changes in medication. The survey of the general public about perceptions of the pharmacy profession enquired who they would ask for advice about medicines; 40% would ask a pharmacist but this was much lower than the 62% who would ask their GP. Thirty-six percent of those who would not seek advice from a pharmacy would always go to their GP (IPSOS Public Affairs, 2015). This is despite the fact that community pharmacists are much more accessible than GPs.

Patients consulting GP for medicines-related queries may indicate an underlying acknowledgement of the power of GPs to make prescribing decisions. Those patients that displayed a paternalistic relationship with their GP may not appreciate the roles of different HCPs in the current NHS and therefore may be more likely to discuss medicines-related issues with their GP even though an alternative HCP may be more accessible and better suited to advise them.

6.3.6 Third subordinate theme - Health Literacy

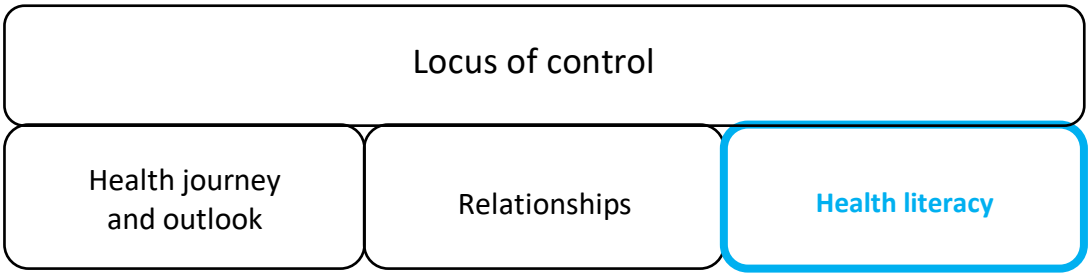


Figure 6-9 Themes from patient interviews: third subordinate theme – health literacy

The third subordinate theme to develop from the patient interviews was health literacy. During the analysis of the patients' interview transcripts, it became apparent that patients broadly fell into two groups in terms of how involved and engaged they were with their health and managing their medicines. Participants two, five and six could be described as 'expert' patients who knew about their diagnoses, why they had been admitted to hospital, what medicines they were taking and why. This group appeared to have good two-way relationships with their GPs, discussed their health and medicines with them, were able to make decisions about their health and had an I-HLOC. Conversely, participants one, three, four and seven were not able to say why they were in hospital, they did not have a thorough understanding of their diagnoses or medicines, they did not question anything their GP told them, did not appear to be interested in finding out more about their medicines and had an E-HLOC. This group also involved their families and other HCPs heavily in making decisions about their health. As well as differences in HLOC, it appeared that there was something fundamentally different about these two groups in terms of their health literacy.

6.3.6.1 Health literacy

Health literacy is defined as:

> "people having the skills (language, literacy and numeracy), knowledge, understanding and confidence to access, understand, evaluate, use and navigate health and social care information and services."
>
> (Public Health England, 2015)

An individual's functional health literacy is their ability to read and comprehend information and instructions in health settings. It has been linked to a person's educational attainment, general literacy and IT skills. In the UK, it has been estimated that 42% of adults between the

ages of 16 and 65 are not able to understand and use health information (Public Health England, 2015). Individuals with low health literacy have been found to be more likely to be admitted to hospital, struggle to manage their health and wellbeing, find it more difficult to access the appropriate health services, have more ED attendances, longer in-patient stays, have less effective communication with HCPs and are less able to have discussions with HCPs about their health (Public Health England, 2015). It has also been found that individuals with limited financial and social resources are more likely to have lower levels of health literacy, which restricts their ability to have control over their health (Public Health England, 2015).

6.3.6.2 Patients' ability and confidence in their own health literacy

For some of the participants, their apparent lack of (confidence in their) health literacy was demonstrated at the very start of the interview as they did not have any appreciation of why they had been admitted to hospital. They had been admitted in a very poorly state but at the time of the interview they had recovered sufficiently to consent and participate in an interview, and therefore sufficient time had elapsed for them to enquire about why they were in hospital if they had wished.

> I: "First of all, I was going to ask you about what brought you into hospital?"
> P: "Ummm, well, I don't seem to know actually."
>
> Patient Three

> I: "And so what happened this time? You had your blood taken and then…?"
> P: "Don't know what happened, all of a sudden my daughter come and tells me [sic]…I think he (the GP) did (telephone) because I'm sure it was me daughter who answered the 'phone."
> I: "And said you had to come in…and did he explain what the problem was?"
> P: "No.
>
> Patient Seven

These participants appeared to be completely deferential to their GP, and if the GP had advised a hospital admission, the participant would concur without question.

Conversely, the participants who appeared to have higher levels of health literacy exhibited a confident and more questioning stance with the GP. It seemed that they would follow their GP's advice but with a greater depth of understanding about what was being recommended

and why. They were prepared to suggest alternative treatments, ask about the aims of the treatment and be compelled to resolve any medicines-related problems.

> I: "So was that something that the GP suggested, it would be easier for you to have this rivaroxaban?"
> P: "No, it was my idea…she (the GP) was a little bit reluctant."
>
> Patient Six

> (The GP told the patient) "sometimes these combinations of drugs cause other side effects and getting you completely under control again requires us to find the optimum dose." So, I said, "what are your criteria for the optimum dose having been reached?"..."I don't think he's (the GP) often asked that one."
>
> Patient Five

> …"I'd have gone back to the doctor, straight back to the doctor and said, 'I just can't take these anymore and I'm not going to take them'…I just said to (daughter), 'I can't go on like this.' She said 'Mum, you must take them.' I said, 'I can't go on'…'So I think really and truly, if people are not satisfied with what the doctor gives them, they should go back to the doctor straight away and say there's either something wrong here, I just can't take them, and I know they are upsetting my stomach.'"
>
> Patient Two

The health literacy of the participants was also shown by who they would ask for medicines-related advice and how much information they wanted before they started taking a newly prescribed medicine.

> I: "…do you feel you've been given enough information about the medicines you've been prescribed?"
> P: "On the whole, yes."
>
> Patient Five

> P: "…when I first started, I used to go down and he (the GP) used to give me a talk"
> I: "I see, yeah. So, do you mean that when you started new medicines, he explained them to you?"
> P: "When I first started taking tablets, I used to go down and he used to talk like. I can't remember what he said."
> I: "No, no. And he used to explain to you, did he, what you were taking any why?"
> P: "That's right, the nurses as well do that."
>
> Patient Seven

It appears that prescribers did attempt to give patients information about newly prescribed medicines. Whether this information was absorbed and understood or whether it was disregarded depended on the patient and how interested and involved they were with their medicines and their level of confidence in their ability to understand and interpret the information they had been given.

6.3.6.3 Discussion of ability and confidence in their own health literacy

For some participants, health literacy appeared to have a significant effect on who they would approach for medicines-related advice and support. By improving health literacy, there could be an opportunity to help this group of patients become more self-reliant, have more confidence in their own ability to absorb and comprehend health-related information and consider approaching other HCPs rather than their GP for advice.

For patients with limited health literacy, improvements have been shown to: reduce disease severity, improve health knowledge, improve adherence to medical instructions, improve engagement and involvement in health and empower people to effectively manage long-term conditions (Public Health England, 2015). The simplest approaches to improving health literacy include ensuring that information about health is presented in a clear and accessible format. In terms of specific instructions for tasks such as administering medication, it can be helpful to demonstrate how to take or use medicines and ask the patient to repeat this back to check understanding (Public Health England, 2015). Strategies such as improving general literacy by increasing access to further adult education or lifelong skills training for the whole population are more difficult to implement and beyond the scope of this study.

Despite initiatives to improve health literacy, there is still a paucity of evidence about the effects on health outcomes. One longitudinal cohort study published in the BMJ did appear to show that low levels of health literacy were associated with higher levels of mortality but studies demonstrating the impact of improved health literacy on mortality have not yet been conducted (Bostock and Steptoe, 2012). A caveat to increased health literacy, as highlighted by Raynor, is that people with better health literacy may still make health-related decisions that are not recommended by HCPs (Raynor, 2012).

HCPs need to ensure that all health and medicines-related information is available in different formats, the ‘teach back’ technique is used for all patients and, as far as possible, health-

related information is presented in a way that is individualised for each person. Using these strategies should help to ensure that patients' needs are met, which hopefully will have positive effects for the patient, HCPs caring for them and the NHS in general.

6.3.6.4 Sources of medicines-related information and advice

The participants who did not know why they had been admitted to hospital appeared to be more likely to ask family members for advice about their medicines or not ask any questions at all. Two participants sought advice from family members; one thought that because his wife took medicines herself it meant that she was knowledgeable about medicines generally. Another had delegated all responsibility for his medicines to his wife; again, this could have been because he felt that she had superior health literacy amongst other reasons.

> I: "…if you've got a question about medicines, who would you ask?"
> P: Err, my wife…because she knows quite a lot about medicines. I mean she's on medicines herself…she got emphysema and her's bad with it but she know [sic] quite a lot about medicines…"
> I: "…is there anyone else you would think of asking, or just her?"
> P: "Just her."
>
> Patient Three

> "Don't ask me what they (tablets) are because I haven't got a clue…the wife does all that for me, she sees to all that."
>
> Patient Four

Two of the other participants did not want any information about the medicines they had been prescribed or why they needed them. One had a lower level of health literacy and appeared to delegate responsibility to the prescriber.

> I: "Who would you ask for advice about your medicines?"
> P: "Wouldn't really. I just take what's given me."
>
> Patient Seven

For the second participant, who displayed a higher level of health literacy, the location of the prescribing appeared to have an impact on the information that was sought prior to starting a new medicine. This participant was willing to ask their GP for medicines-related information but in hospital felt that there was not the opportunity to ask the same types of questions. Also, they had not had sufficient time to build a trusted relationship with the prescriber.

> I: "…when you were in hospital, did anyone give you any information about your, umm, the tablets you were taking?"
> P: "No…just taking it for granted. You've got them, and you've got to take them."
>
> Patient Two

The other three participants were more health literate and reported that they would utilise the patient information leaflets (PIL) to find out more about the medicines they had been prescribed. They were self-reliant and able to identify the PIL as a useful source of information that they would be able to read and comprehend.

> I: "Yes. So, had you looked through the leaflet in the pack when you were newly started on it (rivaroxaban)?"
> P: "I never do that until something happens because I think if you read the leaflet you think oh, my word, look at all this, I'm not going to take this. So, I wait until I see something is wrong, then I have a look at it, the leaflet information."
>
> Patient Six

> I: "And thinking about information that people such as yourself are given about medicines, do you feel it's about right, do you feel you get too little information or…"
> P: "Well, I've never thought of it…as I said, I read the leaflet if I need to."
>
> Patient Six

One participant had the confidence to read the PIL and then went on to have a discussion with their GP about its contents. This participant therefore put themselves on an equal footing with the GP and had confidence in their own ability to have a complex two-way dialogue with their GP.

> I: "…by the sounds of it, you probably like to know a bit more information about what you are taking and why."
> P: "Well, if my GP prescribed medicines for me, there's a big leaflet in the pack and I will go and question them or question him about it."
> I: "So you would refer back to the leaflets in the pack about your medicine if you wanted more information?"
> P: "Or go back to my GP."
>
> Patient Five

For other participants, the PIL was something they said they could not be bothered to read, but in reality this apparent lack of interest seemed to be because they did not have the skills required to absorb, understand and interpret the information within it.

> I: "Often when you start a new medicine, you'll get an information pack…an information leaflet in the pack with it…"
> P: "I don't read it…no, no, I never read 'em, I just listen to what they say and that's it. I take them and that's it."
> I: "And what's your reason for not reading them?"
> P: "Ohh, can't be bothered…can't be bothered. I can't sit down there and just read all these different things because I wouldn't understand half of it anyway, and all these things they come out with drugs and things like that, I haven't got a clue."
>
> Patient Four

One of the other participants stated that they would choose the pharmacist as their preferred HCP to consult if they had a medicines-related query.

> I: "…thinking about information about your medicines, who would you go to, to ask for advice about anything to do with tablets and medications that you're taking?"
> P: "I'd phone the pharmacist…they're pretty good. They're usually pretty good, aren't they? They know straight away, or they'll look it up for you."
>
> Patient Six

> I: "Is there anyone else you would think of asking or would you just go to them?"
> P: "No, I'd go to somebody like that pharmacist, yes."
> I: "That's good. And thinking about all of the medical people that you come into contact with, so doctors, pharmacists, nurses, whoever else you might see at your practice, who do you think would give the best advice about medicines? Who would you trust the most?"
> P: "Oh, I think I'd go for the pharmacist, again…they are used to it aren't they. They are dealing with it 24 hours a day. I think, yes."
>
> Patient Six

From these responses it is clear that people have different requirements when it comes to information about medicines; from no information at all, through verbal and written information, to having a full discussion with the prescriber after conducting their own assessment of the information they had been given. It is therefore important to try and establish the amount and format of medicines-related information that a particular person requires, and this is perhaps best done by a HCP that knows them well.

6.3.6.5 Discussion of sources of medicines-related information and advice

Patients vary in terms of their preferred amount, depth and method of delivery of medicines-related information. This diversity in what patients want was also illustrated by Krska *et al.*,

(2013) who found that more than half of the patients in their study of factors affecting QoL in patients with long-term conditions, wanted verbal information about medicines. More than half of their patients also wanted information in addition to that given by the prescriber, which they would obtain themselves from the PIL, books or the internet. As in the current study, they also found a cohort of patients did not want any information about the medicines they were prescribed; they allowed their doctor to manage their medicine use and felt that accessing information worsened their concerns (Krska *et al.*, 2013). Weinman (1990) found that information affected patients' coping mechanisms; some patients were keen to know about their treatment when they received a new diagnosis, whilst others eschewed information as they found it distressing (Weinman, 1990).

Weinman (1990) summarised some of the factors around providing written information for patients and postulated that patients required written information as they often misunderstood or forgot verbal information. Written information also resulted in increased adherence (Weinman, 1990). A Cochrane review also found that supplementing verbal information with written information increased knowledge and satisfaction scores for patients being discharged from hospital (Johnson, Sandford and Tyndall, 2003).

This range of patient preferences means that HCPs should consider each individual's needs when providing medicines-related information. This approach is also endorsed by NICE in their guidance on medicines adherence, which states that HCPs should adapt their consultation style and communicate in the most effective way for each individual patient (NICE, 2009).

6.3.6.6 Health literacy and MURs

Of the participants interviewed, only one had taken part in a MUR; the others appeared to be unfamiliar with MURs. During the interview process, the MUR service was explained to the participants who were unaware of it, and they were asked for their opinions based on what they had been told. Again, there was an apparent split in the group in terms of whether they thought a MUR would be something that they would be willing to engage with. The participants who had lower health literacy felt that a MUR would not be for them as they would not understand or retain the information they would be given.

> I: "…the chemist can sometimes do something for people called a medicines review, like we said before it's where they go through all the medicines and you can say how you take them and if you get problems with them. What do you think about that? Do you think that would be a useful service that

the chemist would provide?"
P: "Might be to them, yeah…probably be whatsit to me…double Dutch."

Patient Seven

I: "…as I said you can have this medicines review with a chemist where...they go through all your medicines with you and ask you how you take them, if you are having any problems with them and that sort of thing. Do you think that would be a useful thing to have?"
P: "It is for a lot of people, but I mean for people like me like, by the time I've gone out the door it's gone…I just forget it."

Patient Four

One of the participants with lower health literacy did acknowledge that they thought a medication review might be useful. Although their other responses during the interview suggested that they may not have been so willing to engage in the process if they were invited to participate in the 'real world'.

I: "I'm wondering, have you ever had a chat with either your GP or your chemist and you've gone through the medicines that you're taking and they've explained them to you?"
P: "No."
I: "No. And do you think that sort of thing would be useful?"
P: "I reckon it would be, yeah, yeah. I reckon it would be to everybody, I reckon, yeah."
I: "…some chemists offer a service where they sit down with people and they go through each of your medicines in turn and you can say how you get on with it in terms of if you have any side effects from it and that sort of thing…"
P: "I've never had that in me life, never."
I: "You've never had it…not from your GP or anybody?"
P: "No, no. They just give you a script but that's it, goodbye."
I: "And you've never had anything like that, but you think it would be useful?"
P: "Yeah, yeah."

Patient Three

Participants who had a higher level of health literacy had divergent views on whether they thought that a MUR might be useful. One participant felt that it would, but they were unaware of the service.

I: "…thinking about sitting down and having a chat with a pharmacist or a GP about your medicines, do you think that would be something that you would find useful?"

> P: "I've never actually thought of it…no, I think I'm so used to dealing with my medicines and I know what I'm taking…I've been taking a lot of them for years, so no I've never thought of that."
> I: "And is it something you would be particularly interested….?"
> P: "It might be worth a shot…yes, yes."
>
> Patient Six

Another did not think MURs were for them as only the GP had the authority to change their prescription and the community pharmacist did not. Underlying this was a belief that the GP would have the final say in any discussions about medicines and they would have to ratify any medicines-related decisions.

> "I would expect there to be something…about the GP…who would explain why they changed the medicines, but I don't think he'd (the GP) let anything change unless he agreed to it…no disrespect to anyone else."
>
> Patient Five

The participant who had participated in a MUR thought it was a really useful process.

> P: "Every now and again they get you into the office and explain all of the tablets, you know, have you got 5 minutes to spare."
> I: "… they call that a medicines review don't they?"
> P: "Yes, that's right."
> I: "Have you had one of those with the pharmacist…your chemist there?"
> P: "It was good, very good…they talk to you and ask you whether what you're taking…and are you happy to keep on…keep on using it, you know, taking them…"
> I: "And you found that process quite helpful did you?"
> P: (Nodding)
>
> Patient Two

From the HCP perspective, there may be an expectation that all patients would be willing to participate in a MUR and recruiting them was simply a matter of better publicity. This does not appear to be the case as some participants in the current study did not see the benefit of participating. Enhanced publicity of the MUR service may help but the MUR service needs to be tailored to the needs and requirements of the different patient types that attend the pharmacy, irrespective of their level of health literacy.

6.3.6.7 Discussion of health literacy and MURs

All but one of the participants interviewed were unaware of the MUR service. This was perhaps surprising given that MURs have been available in community pharmacies since 2005 and most of the patients in the current study had been taking medicines for a long period of time. In the press, there has been some controversy about MURs, with pharmacists reporting that: they had been put under pressure to complete them, they were not being conducted on the patients who would benefit most, and the annual 400 MUR limit being treated as a target (Sukkar, 2013). This negative publicity could have potentially deterred patients from taking part in a MUR, but as most patients in the current study were not aware of their existence, this seemed unlikely.

Specific studies with patients about the MUR service provided by community pharmacies in England have given useful insights into how patients view them. MURs have been generally well received by patients who have participated in the service; this was reflected in the opinions of the patient in the current study who had participated in a MUR. As discussed in the literature review, Latif, Boardman and Pollock (2013) found that patients were not clear about the rationale for MURs, they did not increase their knowledge but did provide them with reassurance that they were 'doing the right thing' with regard to their medicine-taking. There have been concerns from patients that participating in a MUR or HMR could introduce tension into their relationship with their GP around medicines-use (White, Klinner and Carter, 2012; Latif, Pollock and Boardman, 2013) but none of the patients in the current study described this phenomenon directly in relation to MURs.

The apparent finding that patients with high levels of health literacy were not always willing to participate in a MUR has also been seen in other studies. In the study by Twigg *et al. (*2016) into patients' satisfaction with information about medicines, some of the quotes from patients who appeared to have high levels of health literacy mirrored what the participants said in the current study:

> "as I understand my medication, I didn't really need this facility (MUR or NMS) but I'm sure it is useful for many people."
>
> "neither services (MUR or NMS) will be of interest to me as this is something my doctor and I review regularly. I don't think I would want to review this with a pharmacist anyway."
>
> (Twigg *et al.*, 2016)

In Australia, a study investigating patients' perspectives of the HMR service (White, Klinner and Carter, 2012) found that some participants thought they did not need to have a HMR as they were in control of their medicines and had sufficient knowledge about them (White, Klinner and Carter, 2012).

The community pharmacists providing the MUR service need to personalise their approach to ensure that patients are not only aware of the MUR service but also to ensure that they understand why it would benefit them, no matter what their level of health literacy. Patients with lower levels of health literacy may require encouragement to take an interest in what medicines they are taking and reassurance that the MUR would be tailored to their level of understanding. For patients with higher levels of health literacy, the pharmacists may need to emphasise the complementarity of MURs with services provided by their GP.

6.3.6.8 Preferred HCP for a medication review

Different HCPs offer different levels of medication review; the MUR service provided by community pharmacists has been described as a compliance and concordance review as the patient is present; it is not a full clinical review as the community pharmacist does not have access to the patient's medical notes (Blenkinsopp, Bond and Raynor, 2012). Participants were asked who they thought would be the most appropriate HCP to conduct a medication review; they gave a variety of answers which reflected their own situation, their level of health literacy and their views about the skills and authority of different HCPs.

Two participants with lower levels of health literacy reported that they would prefer to have a medication review with their GP; this was because they felt the GP had more knowledge about health and medicines generally and about their specific situation than any other HCP.

> I: "I'm just thinking…would you prefer to go to a doctor, or would you prefer to go to a chemist (for a medication review)?"
> P: "Doctor."
> I: "You'd go to your doctor, and why would that be?"
> P: "Well, because they got more knowledge…I reckon they have."
> I: "So, more knowledge about what, do you think? About the medicines, or the conditions that you've got, or…?"
> P: "Well, about both, both…"
>
> Patient Three

> I: "And would you ever think to ask the chemist about your tablets at that time?"
> P: "No, no. 'Cos the doctor knows me."
>
> Patient Seven

Other participants did think the community pharmacist would be the best HCP to provide the MUR service; this quote was from the participant who had participated in a MUR.

> I: "…but you found it (the MUR) was helpful?"
> P: "Helpful? If I wanted any help, I'd go and ask them (the community pharmacist)…if I had something I wanted to ask, I'd go there first before I went to the doctor."
> I: "…and why would you do that?"
> P: "Well, they should be able to help you…they should really and that's their job...and they are dealing with tablets, what people are taking, they know more or less all about these things don't they…I mean it's like, say, your job, you've got to know what you are doing…and what you are dishing out."
>
> Patient Two

It was interesting to note that two participants who did not see the benefit of a MUR for themselves, still thought that the community pharmacist would be suitable to advise and assist others with medicines-related problems. They viewed the community pharmacist as an expert in medicines as they were dealing with them every day, even though they would not personally utilise their skills.

> I: "…if you were going to have one of these reviews, obviously you're not necessarily interested in having one, but if that was a service that was offered, who do you think would be the best person to offer that service?"
> P: "Like I said, the people for the drugs and that is the chemist…I mean they are dealing with…the millions of people they're dealing with every day."
>
> Patient Four

> I: "… Who do you think would be the best person to give advice about medicines…?"
> P: "I would think the chemist…well, yeah. They should know about the medicines they are giving, shouldn't they?...The doctor prescribes them, but the chemist should know what they are giving."
>
> Patient Seven

These findings, that patients think pharmacists are well placed to conduct reviews, are positive, but as noted previously, there is a possibility that response bias or social desirability bias were present as the participants knew the PI was a pharmacist, so they may have given the answer they thought the PI wanted to hear.

6.3.6.9 Discussion of preferred HCP for a medication review

Patients gave diverse opinions about who they thought would be best suited to conduct medication reviews. There were various factors that appeared to influence their preferred option, for example, their level of health literacy, support from others, confidence in their understanding of information that was given to them and how they viewed the different HCPs. As previously discussed in the literature review, some patients were concerned that partaking in a MUR with a community pharmacist would interfere with their relationship with their GP (Latif, Boardman and Pollock, 2013). Interestingly, this view has also been expressed by patients in Australia when asked about the HMR service there. This was in spite of GPs being able to refer patients for the service (White, Klinner and Carter, 2012).

Perhaps one solution would be to further integrate community pharmacists into the primary healthcare system. This may help to change patients' perceptions of the service, so they could ultimately view it as an essential part of coordinated care with their GP. The NICE guideline on Medicines Optimisation also suggests that further research is required into medication review. They propose a RCT with a one to two year follow-up, to determine the effect of the type of medication review, the HCP conducting the review and the frequency of the review on patient-reported outcomes, clinical outcomes, medication-related problems, health and social care use and cost-effectiveness (NICE, 2015c). This would help to clarify the optimum conditions for medication reviews in primary care and facilitate them becoming embedded as standard practice through effective commissioning.

The results and brief discussions of the patient interviews have been concluded. The following sections show how they provided a basis to keep patients as the focus of the study and ensure that the fieldwork conducted with community pharmacists was grounded on this base.

6.3.7 How the patient interviews informed the community pharmacist interviews

Three of the themes that emerged from the patient interviews; locus of control, relationships and health literacy, were used to provide the foundations for the questions and statements that were included in the community pharmacists' interviews and questionnaire. The concept was that the patient opinions could be presented to the community pharmacists in such a way that it could be established whether community pharmacists were aware of patients' experiences and attitudes and how this could impact on the services they were offering, such as MURs. The health journey and outlook theme provided the patient-rooted foundation of the study and was not specifically used to inform the next stages of the fieldwork. It ensured that patients were at the heart of the research and established the essential need to reduce the personal cost of medicines-related admissions.

The findings of the patient interviews were used to inform the topic guide for pharmacists' interviews as follows:

- For the theme of relationships, community pharmacists were asked about how they selected patients for MURs/PD-MURs, the willingness of patients to participate in the MUR process and aspects of the long-term relationships that they were able to build with their regular patients.
- For the health literacy theme, community pharmacists were asked about whether patients were aware of the MUR and PD-MUR services, how they assisted patients to get the most out of their medicines and the provision of medicines-related information to patients.

The theme of locus of control was deemed to be personal and individual to patients, so community pharmacists were not asked any specific questions about this area. There is more detail about the topics included in the community pharmacist interviews in Chapter 7.

The findings of the patient interviews also directly contributed to some of the attitudinal statements that were included in the final questionnaire, particularly around the themes of relationships and health literacy.

The statements for the community pharmacist questionnaire that stemmed from the patient interviews and were related to relationships were as follows:

- Community pharmacists are able to build long-lasting trusted relationships with their patients.

- Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.
- Patients see community pharmacists as just the suppliers of their medicines.
- Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.

The statements for the community pharmacists' questionnaire that came from the patient interviews and were related to health literacy were as follows:

- The majority of patients are aware of the MUR advanced services.
- Community pharmacists are able to make valuable contributions to patient care through the MUR service.
- I believe that MURs help patients to get the most benefit from their medicines.

6.4 Strengths and limitations of patient interviews

The patient interviews helped to gain an insight into what is was like to be a patient who experienced a medicines-related admission to hospital and also their experiences and opinions about medication reviews. The use of semi-structured interviews as part of the sequential exploratory mixed-methods study design had various strengths and limitations which are discussed below. This appears to be the first study to have analysed the patient experience of a medicines-related admission to hospital using IPA as the analytical tool.

The strengths of this phase of the fieldwork stem from the determined focus on the patient experience in terms of how their medicines-related admission to hospital had impacted on them, and if they were familiar with medication reviews; this area lent itself to the use of qualitative methods. Using semi-structured interviews allowed an in-depth, detailed, personal account to be gained. Even though a topic guide was used to direct the interview, patients were free to say what they wanted; this helped to ensure issues that were important to them were voiced and consequently, this allowed issues that the researcher had not thought of to be expressed by the participants. The use of interviews enabled participants who may have been deterred from completing a questionnaire (in paper form or online) due to literacy skills or time pressures to participate in the study. The participants appeared to have different standpoints regarding HLOC, health literacy and the involvement of others in their health, this gave depth and richness to the data collected and suggested a heterogenous sample.

The limitations of this phase of the fieldwork were due to the relatively small number of participants and how this may have affected the interpretation and generalisability of the findings. Also, data saturation may not have been reached for this reason. Patients were recruited from one Trust in England and other geographical areas may have different policies and practices which would affect responses to the same interview questions. The use of semi-structured interviews meant that the participants' responses may have been biased by the presence of the researcher who they knew was a pharmacist who worked for the hospital they had been admitted to. The participants may have told the researcher what they thought they wanted to hear rather than their true opinion, an example of response or social desirability bias. Interviewer bias could also be present because it would be difficult for the researcher to truly bracket off their own opinions and experiences to allow the true and unencumbered voice of the participant to be fully heard. The vast amount of data generated by the qualitative interviews, even though there were only seven participants, meant that the transcription and analysis was very time-consuming. The lack of follow-up also meant that it was not possible to discover whether PD-MURs had occurred, and if not, the reasons for that. Consequently, it was also not possible to find out about the thoughts and attitudes of patients who had participated in a PD-MUR.

6.5 Future research

Future research should focus on finding out more about the views and experiences of patients towards PD-MURs specifically. Also, as per the suggestion from NICE, a RCT is required to determine the optimum conditions for conducting medication reviews in terms of the optimum HCP, location, type of review and frequency. Research is required for both MURs and PD-MURs as different parameters may result in better outcomes for each type of review.

6.6 Summary of the patient interviews chapter

The patient interviews gave a rich and varied account of what it was like to be admitted to hospital due to a medicines-related problem. The main findings from the patient interviews were the themes of locus of control, health journey and outcomes, relationships, and health literacy. These findings have answered research questions 1 and 2 that asked:

1. What are the experiences of patients who have had a medicines-related admission to hospital?

2. What are the experiences and attitudes of patients towards PD-MURs and medication reviews in general?

The most important findings of this phase of the research were around the impact of the medicines-related admission on the individual patients. All the patients described their medicines-related hospital admission in wholly negative language, which emphasised the psychological effect it had on them. This underlined the importance of listening to patients, understanding how health-related events impact on them and using this to inform practice.

The other findings provided fascinating insights into how patients differed in their perceived needs regarding control over their health and the information they required. It highlighted that some patients wanted full control over their health and were motivated to seek information to make their own decisions. Conversely, others required support in these areas and delegated responsibility for decisions to others, be that their family or GP. These findings brought to the fore the difficulties in tailoring health information and services to everyone in the general population. There is no one size fits all approach.

Patients placed high value on relationships with others, particularly GPs, who they had experienced an enduring relationship with. They often described situations where they had lost their preferred GP and had not been able to rebuild that relationship with a new GP. The value they placed on their relationship with their GP affected their attitudes towards medication reviews and the HCP conducting them.

Patients who were not willing to participate in MURs had various reasons for that stance. On one hand a lack of ability or confidence in their own health literacy. On the other, for patients with high levels of health literacy, a perception that they were able to fulfil their own medicines-related needs and the acknowledgement of their GP's authority over their medicines.

The views of patients have a huge impact on how services, such as MURs, should be designed. For some patients, the MUR model works well, it achieves it aims, and empowers them to optimise their medicines-taking. For others, it does not work at all, either in encouraging them to use their community pharmacist or to improve their knowledge about their medicines and optimise how they use them. These differing views and experiences of patients need to be

considered when commissioning services if such services are going to have any benefit for the patients individually or the NHS as a whole.

The following chapter will focus on the community pharmacist interviews and how the findings from the interviews with both patients and community pharmacists informed the development of the questions for the community pharmacists' questionnaire.

7 Community Pharmacist Interviews and questionnaire development

Chapter Overview

The focus of the first part of the chapter is the community pharmacist interviews. The second part of the chapter details how the findings of these interviews, combined with the findings of the patient interviews, informed the development of the questionnaire for community pharmacists.

7.1 Introduction

The second qualitative part of the study involved interviewing community pharmacists about their attitudes towards, and experiences of, the MUR service in England. The findings of this phase were considered alongside the findings of the patient interviews and used to develop a series of attitudinal statements and demographic questions for inclusion in the community pharmacist questionnaire.

7.2 Methods for community pharmacist interviews

The community pharmacist interviews formed part of the qualitative phase in the sequential exploratory strategy, as shown in Figure 7-1.

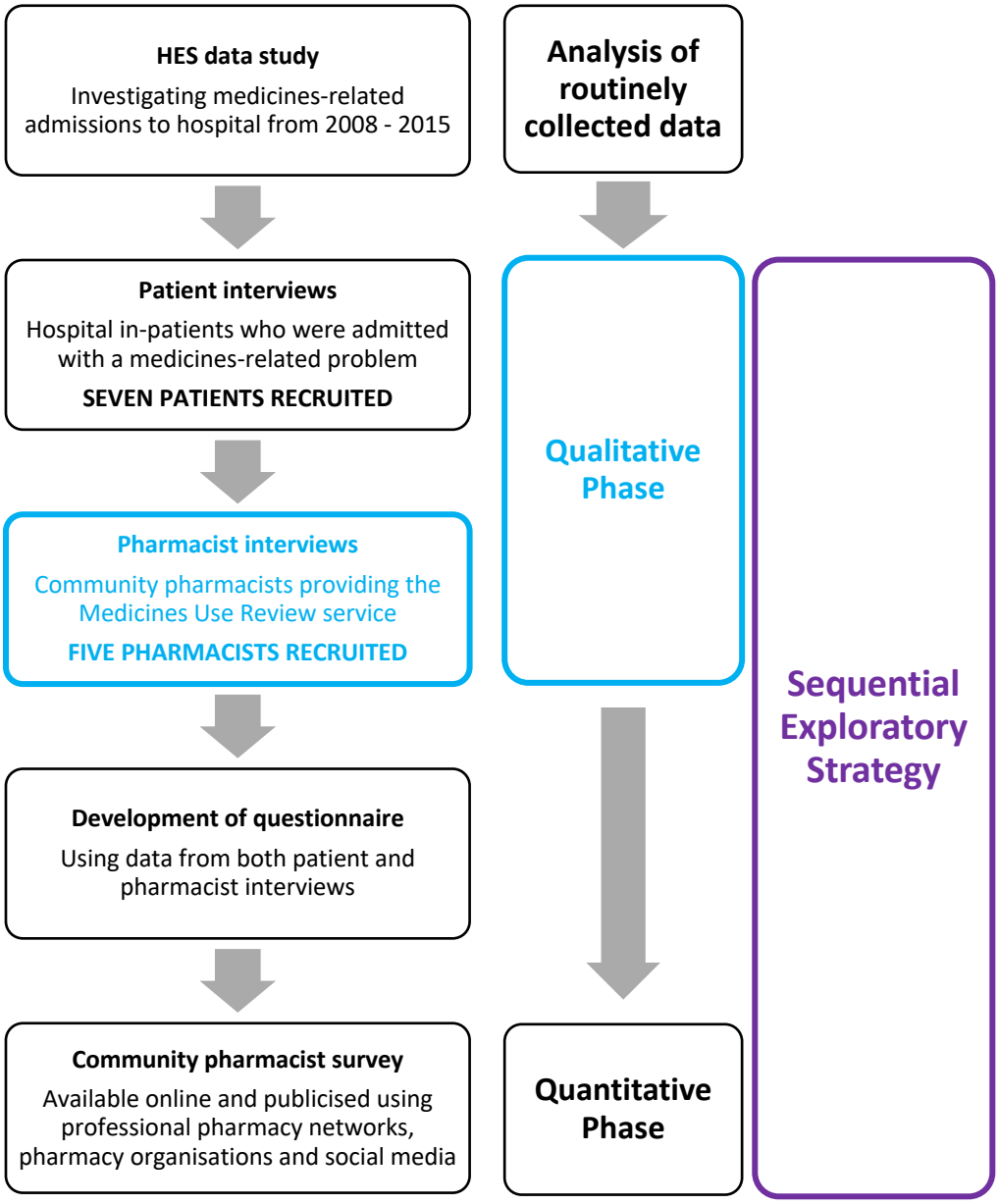


Figure 7-1 Schematic of study - Community pharmacist interviews

The use of semi-structured interviews as a tool for research has already been discussed in section 6.2 as this technique was also used for the patient interviews, albeit with a different focus and topic guide.

7.2.1 Ethical considerations of semi-structured interviewing

The community pharmacists' participation in the interview phase of the study was anonymous and confidential. None of their responses could be attributed to them and only members of

the research team were aware of their identities. The pharmacists were sent an information sheet and were able to ask the PI questions before the interview took place; ensuring that they were able to give their fully informed consent to participate in the study. Interviews were conducted in a neutral, public location or over the telephone to ensure the safety of the interviewer and the interviewee.

7.2.2 Sampling process for community pharmacist interviews

Community pharmacists were sampled purposively, using a 'snowballing' technique involving various methods to invite potential participants to take part in the study:

- letters sent to 24 community pharmacies closest in geographical distance to the PI's home address.
- emails sent to contacts at local pharmaceutical committees (LPC).
- messages posted on professional group message boards e.g. the Royal Pharmaceutical Society (RPS).
- posts on social media platforms such as Facebook, LinkedIn and Twitter by members of the research team.
- emails sent to personal contacts of the research team.

The call for participants on Twitter was particularly fruitful. A member of the research team with more than 380 followers tweeted the call for participants; this message was retweeted by 32 Twitter accounts and the number of people who had the potential to see the retweets was over 32,000 (based on the number of followers of people who retweeted the original message).

7.2.3 Recruitment for community pharmacist interviews

Eight pharmacists volunteered to participate in an interview. Two pharmacists were recruited via email as they were personal contacts of the research team and six were recruited following the call for participants on social media. Five pharmacists were actually interviewed for the study; four female pharmacists and one male pharmacist. One female pharmacist was interviewed in person and the other pharmacists were interviewed by telephone. All participants worked for large multiples. The participants were sent a consent form and participant information sheet prior to the interview which they were asked to sign and return (either electronically or by post). The consent form and information sheet are included in Appendix D. Participants were given information about how to withdraw from the study if they

wished to do so after the interview. If they had wanted to withdraw, their responses would have been removed from the analysis, but no pharmacists requested this. The pharmacists who agreed to be interviewed received a £10 Amazon voucher at the end of the interview as a thank you for participating.

7.2.4 Interview process for community pharmacists

The interview topic guide was informed by issues raised by the patients in their interviews and also subjects that were deemed to be important to providing the MUR service. The topic guide can be viewed in Appendix D. The semi-structured interviews were audio-recorded. The audio files were stored on a password protected computer. A file linking the pharmacist's demographic details to their audio recording was kept in a password-protected file on a personal computer. After the completion of the study, the audio recordings were deleted without any break in confidentiality.

The interview recordings were transcribed verbatim and anonymised by removing any identifiable information. These transcripts were then checked and corrected against the original recordings. The finalised transcripts were imported into NVivo, a qualitative data analysis software package, to assist with the analysis. The transcripts were analysed on a password-protected computer.

The interviews were analysed using thematic analysis, as described in the following sections. The findings of the pharmacist interviews were then used to inform the survey questions. The anonymised transcripts will be stored on a password-protected computer for five years after completion of the study. After this time, they will be deleted without any break in confidentiality.

7.2.5 Thematic analysis

The interview transcripts were analysed using thematic analysis, which has been defined as searching across a dataset to find repeated patterns of meaning (Braun and Clarke, 2006). There are different stages to the process, which are outlined in Figure 7-2.

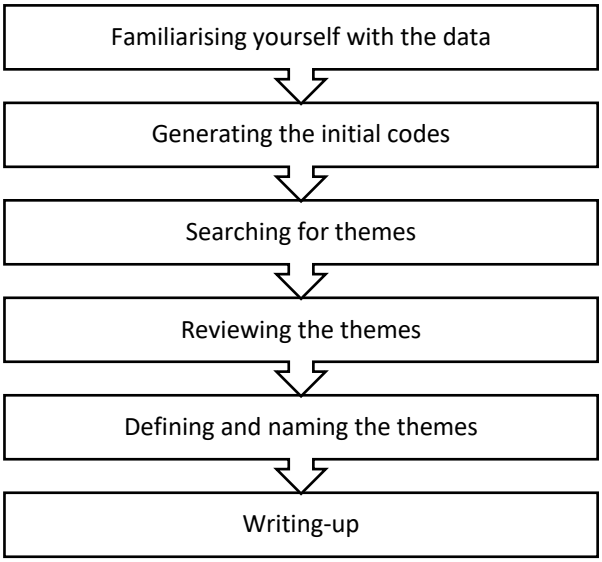


Figure 7-2 Phases of thematic analysis (Braun and Clarke, 2006)

This method was chosen as the aims of the community pharmacist interviews were to find out more about what providing the MUR service is like for them; it was not necessary to conduct an IPA-style analysis which would have investigated how pharmacists attributed meaning to these experiences. Rather, it was important to discover more about the practical and day-to-day issues faced by community pharmacists. This information could then be used in the design of the survey of a larger cohort of community pharmacists to find out if these issues had any resonance with them also.

7.2.6 Thematic analysis of community pharmacist interviews

The transcripts of the community pharmacist interviews were read and checked. For the thematic analysis, the transcripts were re-read, and codes were generated during this process. In the first stage, interesting points raised by the community pharmacists were highlighted. Once all the interviews had been read and coded in this way, this information was transferred into NVivo. This allowed the codes to be more easily categorised into topics or themes, which were summarised in a mind-map annotated with further detail of these areas.

Using these themes, short summaries were generated for each theme to promote discussion. These summarised the title of the theme, a list of codes relating to the theme, associated quotes from the interviews, a narrative passage written about the theme and potential attitudinal statements that could be included in the community pharmacist questionnaire. These summaries were discussed with the supervisory team and the attitudinal statements

that would be included as Likert scale questions in the questionnaire were finalised. Each theme is discussed in more detail in the next section.

7.3 Results of community pharmacist interviews

The themes from the community pharmacist interviews could be summarised in four main areas, which are shown in Figure 7-3.

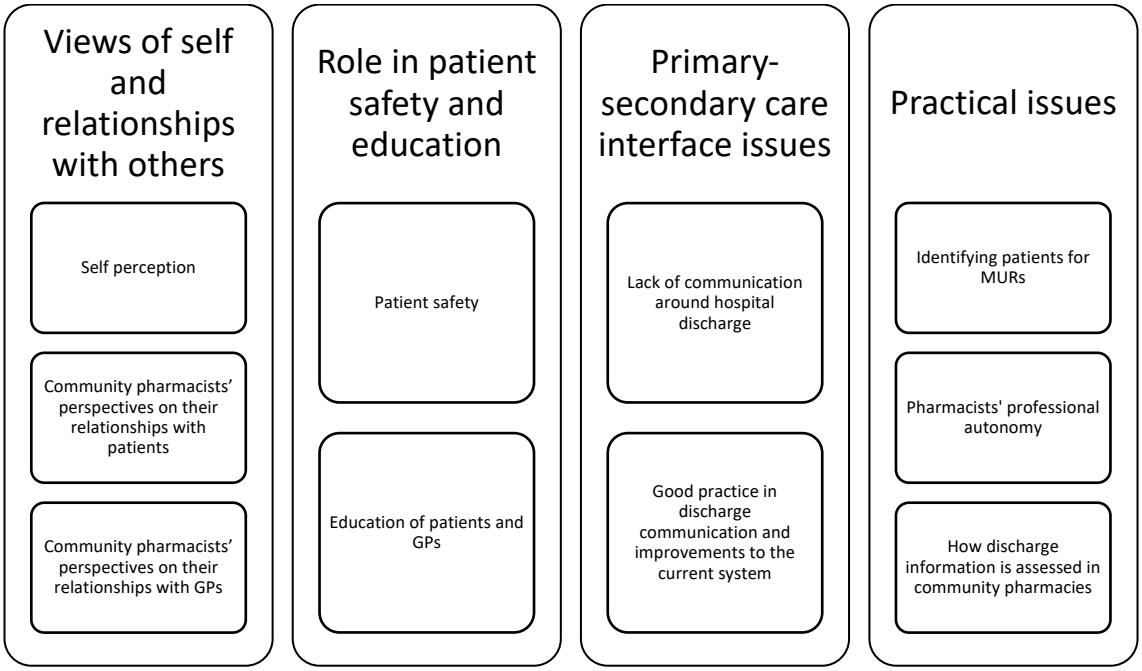


Figure 7-3 Themes from community pharmacist interviews

Again, the convention is that the interviewer is denoted as 'I' and the participant as 'P' in the quotations.

7.3.1 Theme One - Views of self and relationships with others

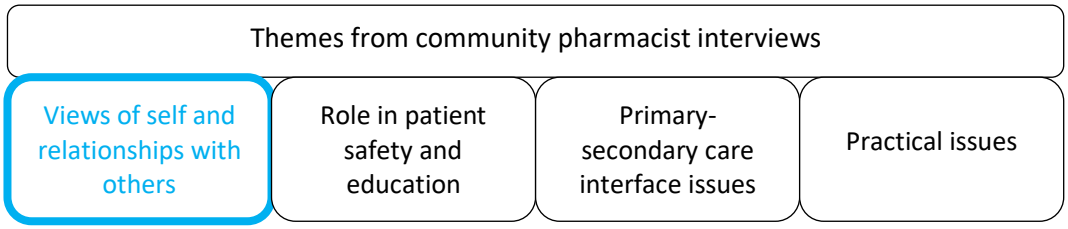


Figure 7-4 Themes from community pharmacist interviews: Theme One - Views of self and relationships with others

7.3.1.1 Views of self

Community pharmacists view themselves as having a wider role, not only in the supply of medicines, but also in ensuring that patients are able to use their medicines safely. They were willing to conduct MURs for the benefit of their patients, but some did acknowledge that another healthcare professional may be better placed to conduct PD-MURs. This was mainly due to lack of access to the discharge summary and associated clinical information that would ensure the PD-MUR would provide benefit for the patient. Time was also another factor; one of the community pharmacists thought that a pharmacist in a GP surgery would be able to see the patient during a scheduled appointment, which was preferable to the community pharmacist having to fit it into their day in an ad hoc manner.

> "…in our area now, two of the three surgeries that we use most frequently, or we have closest contact with, have both got a full-time pharmacist working with them and to be honest they are probably better placed than I am because they would be able to allocate a slot of time to go and do that whereas I have no control over my workflow."
>
> Interview Pharmacist 5

A recent paper by Rutter, Ramsbottom and Fitzpatrick (2017) reported that community pharmacists involved in providing PD-MURs found them to be more complex than other types of MUR and took on average between 20-39 mins to complete (Rutter, Ramsbottom and Fitzpatrick, 2017), which could prove difficult to accommodate in a busy community pharmacy. This suggests that community pharmacists have an awareness that although they have the requisite skills, other pharmacists may be better placed to conduct post-discharge medication reviews.

7.3.1.2 Community pharmacists' perspectives on their relationships with patients

Community pharmacists perceived that some patients saw them as only the suppliers of their medicines and did not want them to be involved in their care any further.

> "sometimes I see patients who don't want any intervention, they just see the pharmacy as a sort of supply process whereby we take in the prescriptions, get the medicines, and off you go…they don't see the pharmacy as any other thing, other than supply; a packaged good provider. So, we try to intervene, and we try to say to individuals that we can provide more than just medicines."
>
> Interview Pharmacist 4

This suggests that this may be because patients are not aware of the extended roles of community pharmacists. Some patients appear to have a more paternalistic relationship with their GP and do not want community pharmacists to have any additional involvement in their care.

> "…that's very much a hands-off approach from the patient, I think…'the doctor knows what is best and knows what I am able to take.' Yeah, so I have come across individuals like this, yeah. And this tends to be more of the older generation, those individuals who are...60 years plus individuals and they probably have grown up with that."
>
> Interview Pharmacist 4

All the other pharmacists also reported difficulties in engaging patients with the MUR process. This appeared to be because they had already had a review with their GP or did not want to jeopardise their relationship with their GP by involving the pharmacist.

> "their response is "Oh, I've spoken to the doctor and I don't want to waste any more time doing this"."
>
> Interview Pharmacist 1

> "Oh, yes, quite often yes. I have heard it many times that in a way they prefer to discuss that with their GP.
>
> Interview Pharmacist 2

> "...some patients they are a little bit reluctant, especially when they hear that we may need to share information with their GP."
>
> Interview Pharmacist 2

> "… and said, 'I'll talk to the doctor about it, I don't want to talk to you.'"
>
> Interview Pharmacist 5

Community pharmacists reported that they thought carefully about how they invited patients for MURs because patients tended to refuse, either because they did not know what it was, or the word 'review' put them off.

> "…sometimes some people will say 'I don't think I want to do this.' But when I explain that I'm checking how you're getting on with the use of your medicines because it works well with what the doctor has already done."
>
> Interview Pharmacist 1

> "I think people who refuse probably they were mainly people who didn't actually know what it is….they didn't want to get involved with something that they won't like…so basically they…people didn't get chance to explain to them what exactly it is for, it's just a benefit for them but yes, somehow…again, there's a lot of selling going on and it's quite difficult to distinguish when, you know, something is genuine and something is something that may trick them into something else."
>
> Interview Pharmacist 2

> "Right, well over the time, I've learned that you don't say, 'Do you want a review?' because they run away a mile. My usual opening line is 'have you got a few minutes just to talk about your medicines today?'"
>
> Interview Pharmacist 3

One pharmacist felt that if GPs referred patients for PD-MURs, patients would be more likely to accept their role.

> "So, we might get a system where patients are referred from their GP to the community pharmacist, then the patient would know that it's not just the community pharmacists just trying to get in the way, which is how we feel sometimes."
>
> Interview Pharmacist 1

Despite pharmacists having to persuade some patients to have a MUR, once patients had participated in one, they were generally agreeable to having another in future.

> "They can see the change and they say: 'this is more helpful than what I got at the doctor' because they can actually see how to use it and practice how to use it, so you do get feedback like that."
>
> Interview Pharmacist 1

> "I've got an observation that if they have it once, they find it useful, then they are invited the following time, they are quite happy to have it done. Some of them are even more prepared, they know what it is about, and they are more willing to share. Umm, because some patients they are a little bit reluctant, especially when they hear that we may need to share information with their GP."
>
> Interview Pharmacist 2

> I: "…do you find that people are quite willing to come back for a repeat MUR?"
>
> P: "Yes, yeah…different issues crop up or sometimes the same issues that they haven't err…very often they've sort of followed up on suggestions you've made, and they are quite grateful."
>
> Interview Pharmacist 3

Patients must trust their community pharmacist otherwise they will not agree to a MUR. From talking to community pharmacists, it appeared to be relatively easy to start a relationship with the patient if they were coming to collect their prescription regularly from the pharmacy, as familiarity helped to build trust.

> "If you see them every 4 weeks you tend to get to know them and they get to know you better rather than some counties that give…there are some counties that give out three months' supply at a time and then you only see them 4 times a year as opposed to 12 times…so that does make a difference. And it gives you more opportunity to sort of get to know them and them to feel happy asking you questions"
>
> Interview Pharmacist 3

> "…the patients, they see me throughout the year…they are more than happy to sit down with me just to get a check up on how they are getting on."
>
> Interview Pharmacist 4

> "I've been here for a long time now and I know the patients, the patients know me so if I go out to them and say, 'have you got time for a quick chat that I mentioned?' then I'll tell them a bit more about why I'm doing it."
>
> Interview Pharmacist 5

It seems that pharmacists need to have a greater depth of involvement with patients; educating them about MURs and how they can benefit them, and also taking time to build trusting relationships with them.

7.3.1.3 Community pharmacists' perspectives on their relationships with GPs

The relationships between community pharmacists and GPs was quite variable. This could be because each community pharmacy has to communicate with a potentially large number of different GP practices. In general, community pharmacists reported that they did not receive feedback from GPs when they made recommendations during a MUR.

> "No, no, no, I haven't had feedback."
>
> Interview Pharmacist 1

> "I don't think I've ever had any feedback from anyone ever…well not from GPs anyway"
>
> Interview Pharmacist 5

This was despite wanting feedback, so they knew their efforts were not wasted.

> "…reliable feedback and to know that you're not just sending notes into nothing."
>
> Interview Pharmacist 3

The community pharmacists appeared to circumvent this problem in a variety of ways. One pharmacist did not contact GPs directly with MUR recommendations, preferring instead to get the patient to discuss issues with their GP directly.

> "over the years I've found that rather than going to their doctor on their behalf I'm better off suggesting to them, this is what you need to go and talk to your doctor about…and letting them…pick it up with their GP themselves. And we have had people come back and say 'I did what you suggested and spoke to them about this' and now that's sorted…I think, it also seems to give them the permission to go and question something because a lot of them don't want to go…whereas if I suggest that maybe there might be an alternative, go and have a chat, then they'll follow it up when they wouldn't do otherwise."
>
> Interview Pharmacist 5

One pharmacist described having access to a pharmacy technician that was working in a GP practice and due to their pharmacy background, they had an innate understanding of pharmaceutical issues that the community pharmacist had identified. There was a perception

that the GP surgery may view the pharmacist negatively when they presented them with queries.

> "one of the senior technicians from the pharmacy, and they've been employing her for, I don't know how long, 4 or 5 years, and even she's really useful because she really understands the problem, you know. If you call with a problem, or whatever she'll get it sorted out…I think if they can see both sides of it, they know what your problem is and you're not just being a pain."
>
> Interview Pharmacist 3

Only one community pharmacist reported that they received feedback about the recommendations they made during MURs.

> "…that's another good thing about the place I mostly work because the surgery's just across the road and if I send a report, they sort of act on it straight away."
>
> Interview Pharmacist 3

Pharmacists did not feel that GPs were aware of the services they were able to offer patients.

> "doctors don't know that we are offering the new medicines service, they don't know we're offering MURs, they don't know we're doing the 'flu (vaccination service) and they go 'why are you doing this?', that sort of thing, because I think they also have their targets to meet."
>
> Interview Pharmacist 1

The lack of two-way communication between community pharmacists and GPs, and often negligible relationships coupled with feelings of negativity by the pharmacists in some geographical areas, gives the impression that GPs do not appreciate the role of community pharmacists over and above a supply function. This does not help community pharmacists to feel that they are a full part of the primary care team and this, combined with a lack of information around hospital discharge, does not help to dispel the problem.

7.3.1.4 Summary of views of self and relationships with others

Community pharmacists need to have increased confidence and pride in their role, and in their ability to support patients with their medicines after hospital discharge. Part of the lack of confidence arises from patients and GPs not always knowing about their role and how they can make positive contributions to patient care. Healthcare professionals, such as GPs and hospital

pharmacists, should promote the support that is available from community pharmacists after discharge. This could be done informally by talking to patients or formally through a secondary to primary care referral system. Ensuring that community pharmacists are part of the core primary healthcare team would mean that everyone was aware of the services they offered, and patients would be encouraged to use them.

7.3.1.5 Potential attitudinal statements

From the thematic analysis of the interviews with community pharmacists, a list of potential attitudinal statements that could be included in the questionnaire was formulated:

- GPs have a high regard for the contribution of community pharmacists to the care of their patients.
- Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.
- The majority of patients are aware of the advanced services that community pharmacists offer e.g. MURs.
- Patients see community pharmacists as just the suppliers of their medicines.
- Community pharmacists are able to build long-lasting trusting relationships with their patients.
- Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.
- GPs view community pharmacists as just the suppliers of their patients' medicines.
- GPs/community pharmacists/practice pharmacists are better placed to conduct post-discharge medicines use reviews.
- GPs should conduct more thorough medicines reviews for patients, so MURs are not required.
- Community pharmacists have the right skills to perform high-quality MURs.
- I have a good relationship with GPs in my local area, that involves two-way communication.
- GPs in my local area ask for my advice about medicines-related issues for their patients.
- GPs should provide feedback to community pharmacists when recommendations are made as a result of a MUR.
- GPs should refer patients to community pharmacies for MURs.
- I find conducting MURs a satisfying part of my job.

7.3.2 Theme Two - Role in medication safety and education

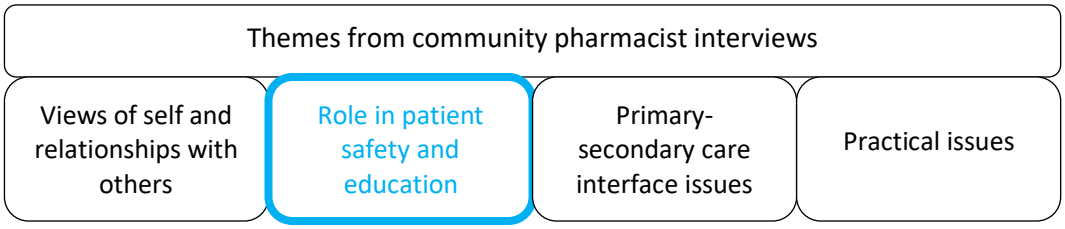


Figure 7-5 Themes from community pharmacist interviews: Theme Two – Role in medication safety and education

Talking to community pharmacists it was apparent that they took their role in patient safety and patient education very seriously and felt that they were well placed to offer medicines-related advice to patients in these areas.

7.3.2.1 Patient safety

There are inherent risks when a patient transfers from secondary care back to primary care, especially as they may have had significant changes to their medication regime. Pharmacists gave examples of specific patient safety issues that they had experienced in their practice. One problem that was highlighted was that reception staff often updated the patient's repeat medication list from the hospital discharge summary. This is far from ideal as hospital discharge summaries are written to be reviewed by a doctor or other health care professional. If a member of reception staff is the only person to review the discharge summary there is a risk that important follow-up information or monitoring could be missed.

> "…and in the GP surgery to be fair these discharge letters they go to the reception staff…they don't go to the doctors and quite often they are not even properly entered, many things get missed off, it all depends on the prescription clerk whether they'll pick up everything that (is) in the letter."
>
> Interview Pharmacist 2

> "…there was one…that should have gone off the repeat…it should have gone off after…12 months or 18 months, something like that, so I queried it and he (the GP) said 'I do not know how that has remained, I'm so grateful that you do this.'"
>
> Interview Pharmacist 1

Some community pharmacists did report that they had contacted hospital pharmacy colleagues to clarify medication-related issues, although they reported that it was difficult to know how to get in touch with the correct person in the hospital.

> I: "Have you had to go back and try to contact hospital pharmacists about anything?"
>
> P: "Occasionally, when something's not been clear on discharge summaries, we've gone back to clarify stuff, or maybe they've asked us to find something out but that's generally the extent of it, it just clarifying various issues around dispensing something, either what have we done before …they got to hospital or what you done [sic] in hospital that we now need to do because they've come out."
>
> Interview Pharmacist 5

Community pharmacists were keen to know what patient education had occurred in hospital as sometimes it was necessary to reiterate the message; they appreciated that patients may not be able to recall or understand everything they have been told in hospital.

> "…patients don't really understand as much in terms of the medication that's been given to them…and it would be good just to see what the pharmacist said in hospital so that we can repeat the same information but maybe in a different environment so that they are more likely to absorb and understand."
>
> Interview Pharmacist 4

This shows that community pharmacists were keen to ensure that patients were using their medicines as safely a possible.

7.3.2.2 Education of patients and GPs

As well as their patient safety role, pharmacists thought they were in a good position to offer medicines-related information and education to patients and GPs; they saw themselves as the 'medicines experts' in the community. One of the community pharmacists was very passionate about being able to support GPs by providing medicines information to them.

> "…But we try to liaise with those doctors as well, to say that if there are any queries about a particular medicine that they are not sure of, drop it as an email or a phone call to the pharmacy and we use our medicines information services in the community to find out the right answer and get back to them…increasing our sort of profile about medicines information."

Interview Pharmacist 4

Patients also demonstrated a desire for further information about their medicines, about issues such as interactions and side effects. Perhaps more should be done to promote the information/education role of community pharmacists. Some patients appeared to appreciate the opportunity, within the MUR, to further their knowledge about their medicines and find out how to use them safely and effectively.

> "it's a two-way sort of thing because I find out if they are doing well in terms of their therapy and taking of medicines, and in turn they find out whether or not they should be taking x, y, z painkillers or I've just heard about this new herbal remedy and then they give me the work to do. So, I will go back and say, 'Let me find out, I'll find out and then get back to you.'"

Interview Pharmacist 4

All the community pharmacists talked about conducting MURs which revealed hidden medicines-related issues for a particular patient. They felt the MUR discovered an untapped medicines-related need that had not been immediately apparent. The pharmacists felt that it was not always easy to identify the patients who had the greatest medicines-related needs.

> "sometimes you go in for routine use review and then you realise, oh actually this person needs an MUR more than I thought they did…and as you talk to them you find oh gosh, yeah, there are issues you should be handling."

Interview Pharmacist 1

> "…it's like MURs, you can think it's going to be really useful and actually you've got a patient who knows everything, understands everything and really doesn't need any help and you get somebody else who's only having a few medicines which seem straight-forward to us, which actually they haven't got a clue about."

Interview Pharmacist 3

The time around hospital discharge was again shown to be critical to patients taking their medicines effectively and an area where community pharmacists could support patients through a PD-MUR.

> I: "Do you think patients who've been discharged would be a good group of patients to be able to talk to? Do you think an MUR would be beneficial for them?"

> P: "Yes, I think they are probably the best ones for MUR because obviously they…for many of them there is something major…after major surgery or something, they have started a lot of medication, it is quite good to know why they take it, and how to take it and how to maintain everything."
>
> Interview Pharmacist 2

7.3.2.3 Summary of patient safety and medicines-related education

The main issue around education of patients and other HCPs is to ensure they are aware of how the community pharmacist can support patients with their medicines, not just around the time of a hospital discharge but also at other times, for example when medication regimes are altered, or new medicines are started. There is also an acknowledgement that to be able to provide this high-quality information, community pharmacists require access to information about the patient that has traditionally not been available to them, and also the time to use the information effectively. Quite radical changes are required in terms of IT infrastructure to allow this to happen but in the meantime, it is important to find out what information community pharmacists require to work in new and innovative ways for the benefit of their patients.

7.3.2.4 Potential attitudinal statements:

- Community pharmacists can provide patients with better information about medicines safety than GPs.
- GPs have access to sufficient medicines-related information to make safe prescribing decisions.
- Community pharmacists would be able to provide a better service to patients recently discharged from hospital if they could conduct MURs in the patient's home.
- PD-MURs are more complex and time consuming that other types of MUR.
- MURs are not conducted on patients with the most complex medicines needs.
- Community pharmacists regularly identify major issues relating to patient safety.

7.3.3 Theme Three - Primary-Secondary care interface issues

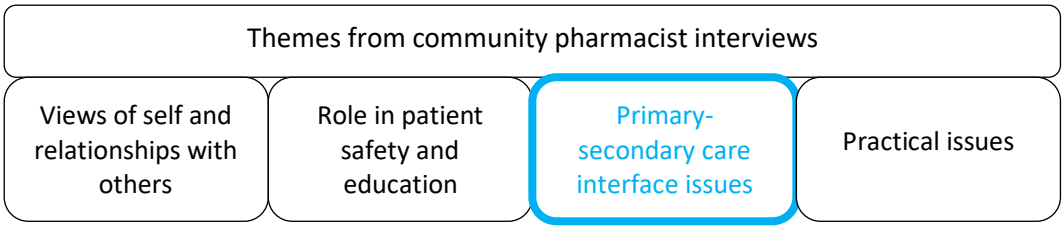


Figure 7-6 Themes from community pharmacist interviews: Theme Three – Primary-secondary care interface issues

7.3.3.1 Lack of communication around hospital discharge

The major barrier for community pharmacists conducting PD-MURs was that they did not know when their patients had been in hospital. For certain cohorts of patients, such as those using compliance aids, the hospital pharmacy did inform them, in an attempt to reduce wasted efforts in dispensing or delivery, but this was unreliable.

> "…we also do the Dossett boxes…so those patients are easily identified because they probably wouldn't have picked up or the delivery would be missed. Nobody tells us if they are going to go into hospital. So, we take the medication there, and there's nobody there and then a neighbour will say, 'Oh, they're in hospital'."
>
> Interview Pharmacist 1

Pharmacists also reported that they may receive a copy of the discharge summary for patients using compliance aids. For patients using medicines from standard boxes, these cues do not exist. Community pharmacists tended to discover patients had been in hospital by accident. This usually occurred when the patient told them, either because they had a query about their new medicines or if the community pharmacist invited them for the NMS and then discovered the new medicine was commenced in hospital.

> "…if they don't tell us that they've been in hospital and they have been recently discharged there is no way to know that basically they have been in hospital."
>
> Interview Pharmacist 2

> "…mainly I found out they were post-discharge when we start to talk, and patients mention that actually, they were not long ago in hospital and certain things and they started there and they stopped."
>
> Interview Pharmacist 2

> "…usually that's when people would come to me and say, 'I've come out of hospital and I've got all these, and I don't know what they are.' So then, I would opportunistically say, 'Well, would you like me to go through them with you and explain them to you? So, it does happen occasionally but it's rather the patient flagging it up than us being able to identify them normally."
>
> Interview Pharmacist 3

> "…only when they presented with that prescription which you knew was part of the new medicines service because the patient said, no I've already taken it. My first course, my first lot was from the hospital on discharge…and this second lot is from my GP. And then you say okay, this would potentially be a discharge MUR."
>
> Interview Pharmacist 4

The patient safety issues around community pharmacists not knowing that someone had been in hospital was highlighted by one participant, who outlined the problem of ensuring that patients were taking the correct medication after discharge.

> "The most difficult thing is, if we are delivering out to them and we are managing their repeats, it means that we miss some. We are told that they are not there, they have missed a delivery, we don't hear from them and then we try again and then they are there, maybe they are back from hospital, but they are getting their old medicines. But if we know ahead of time, we probably will chase up the dose change, or if it hasn't changed, or if we receive a prescription we will say "oh, we've received this saying that the dose should have changed and it's still the same." So, definitely, it would be helpful."
>
> Interview Pharmacist 1

Community pharmacists are now managing more patients' repeat medicines and if they do not know someone has been in hospital or have details of their updated medicines, there is a risk to patient safety if they continue their previous medicines either instead of, or in addition to, their new medicines.

7.3.3.2 Good practice in discharge communication and improvements to the current system

There were some pockets of good practice where community pharmacists received referrals for PD-MURs from the hospital, or where the discharge summary was sent to community pharmacists on the PharmOutcomes system.

> "I think he got referred to us by the hospital, I think the hospital did suggest that he was on so much new medication that if he wasn't sure, he could have a chat to the chemist, so he did"
>
> Interview Pharmacist 5

> "…some areas are better than others…in one county that I sometimes go to, in a very busy place, they will send … the hospital pharmacy there will ask who the community pharmacist is and send instructions out to them about what they should be having, which obviously is very good, but that doesn't happen everywhere."
>
> Interview Pharmacist 3

Community pharmacists were asked about how the current system could be improved, and a number of suggestions were made. One pharmacist suggested that anything would be an improvement on the current system.

> "…well just anything would be a help really…"
>
> Interview Pharmacist 5

One pharmacist suggested that just being alerted to the fact someone had been in hospital would be sufficient. A note of this would be enough to trigger the offer of a PD-MUR the next time the patient visited the community pharmacy.

> "Having an alert, or something to say Mrs So-and-So has been in hospital and just to check their records or something would be great."
>
> Interview Pharmacist 1

7.3.3.3 Improvements at the primary-secondary care interface

A more formal system of informing the community pharmacist that a patient had recently been discharged from hospital was suggested as a simple way to identify patients who would be eligible for a PD-MUR. This could come from the hospital or the GP surgery. If the notification came from the hospital, with the discharge summary, a PD-MUR could then occur in a timelier manner, rather than waiting to receive the cue from the GP. If the notification came from the GP, there may be a delay and also lack of access to the discharge summary.

GPs could advise patients to go to their community pharmacists for a PD-MUR and this could increase patients' use of the service. Referrals from GPs would validate the service and

encourage more patients to use the opportunity for a PD-MUR. Patients could also be educated about PD-MURs whilst in hospital which may persuade them to participate in one after discharge.

> "Whether or not they (hospital pharmacists) could ask the patient when they are being discharged, 'would you like us to inform your chemist?...And then you can go and have a chat when you get home about what we've done.' If they've changed lots of stuff. It's got to come from…it's going to have to come from either the GP or the hospital because we're not going to know."
>
> Interview Pharmacist 5

7.3.3.4 Potential statements for questionnaire:

- Patients should have a nominated community pharmacy that is informed when they are admitted to/discharged from hospital.
- Discharge summaries for patients recently sent home from hospital should automatically be sent to the patient's community pharmacy.
- Hospital pharmacists should promote the PD-MUR service to patients when they are in hospital.
- Hospital pharmacists should not inform patients about the PD-MUR service, as they are spending time promoting a service that the community pharmacy gets paid for, but they do not.

7.3.4 Theme Four - Practical issues

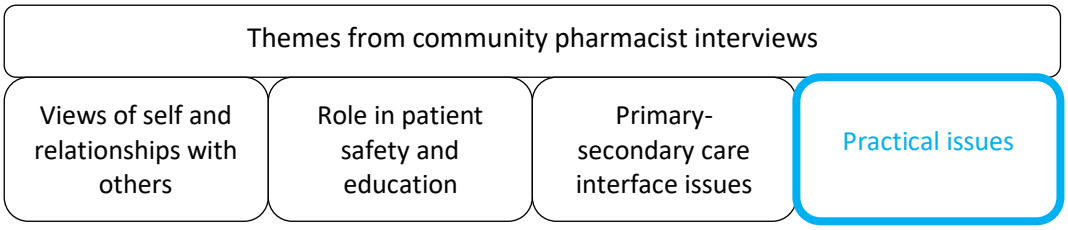


Figure 7-7 Themes from community pharmacist interviews: Theme Four – Practical issues

7.3.4.1 Identifying patients for MURs

Most pharmacists reported that patients were identified for general MURs using the pharmacy computer system. These systems appeared to be sophisticated in terms of being able to identify and highlight patients taking certain groups of medicines or those on certain numbers of medicines, and took into account whether the patient had participated in a MUR in the previous 12 months.

> "It would usually be the computer because every year we would record who's done it and who hasn't. The patient's records would help identify if they've had it within the year and if not, we would look at what they are on and would be able to see if they would benefit from a use review."
>
> Interview Pharmacist 1

> **"**I mean usually they are identified mostly by the computer system as being eligible for a check-up, so I would look at them, and other staff if they were checking or labelling would also highlight any they thought were necessary. So mostly that way…of course there are a few that will request and want to ask questions but mostly it's just routinely, or just try and grab them when they're in."
>
> Interview Pharmacist 3

7.3.4.2 Pharmacists' professional autonomy

Pharmacists did report that even though their employer may have a target for the number of MURs conducted, it was down to the pharmacist to decide which patients were in most need of a MUR and this maintained the professional autonomy of the pharmacist.

> "It's free choice, it's very individually emphasised…it's entirely up to myself…"
>
> Interview Pharmacist 4

Pharmacists did highlight that they had no control over certain aspects of their workload, so this sometimes made it difficult to prioritise MURs.

> "It doesn't always work out like that because you get more walk-ins and more queries from patients who want to buy over the counter it's really frustrating, but we definitely make the time."
>
> Interview Pharmacist 1

> "…all the pharmacies I worked at were very, very busy…"
>
> Interview Pharmacist 2

7.3.4.3 How discharge information is accessed in community pharmacy

Considering how community pharmacists are able to access discharge medication information, it was clear that the situation varied depending on the location of the community pharmacy. Some pharmacists worked in areas where the discharge summary was sent to them through the PharmOutcomes system, or via fax for patients using compliance aids. Community pharmacists said that they often saw the discharge summary when a patient brought it to show them because they had a query about their medicines.

> "…they come in for medication and they are querying why they've been given a different strength, and then bring this sheet out to say that, "oh, look there has been this change."
>
> Interview Pharmacist 1

> "I see discharge prescriptions mainly when there is a query and they are not quite sure, and they will say, 'oh, I'll bring you the letter from the hospital, so you can have a look.'"
>
> Interview Pharmacist 2

Even when the discharge medication list was available, pharmacists reported that on occasion they had to try and contact the hospital to clarify details about the list.

> "Quite often, more clear directions because if the directions are not clear, or if I deal with the prescription that has come from hospital, and quite often it doesn't say for how many days or the dose is not clear. Or there is some sort of error, it is, umm, sometimes it is a product we can't get hold of straightaway so,…I need to clarify if they need it straightaway or if they can wait a couple of days, or a week if it is something special."
>
> Interview Pharmacist 2

7.3.4.4 Pharmacists' suggestions for improvements to the current system

The current arrangements around hospital discharge are far from ideal and the community pharmacists that were interviewed were asked for suggestions about how things might be improved. The main issues were around having access to the discharge summary, for all patients, in an accessible format; for example, electronically or by accessing the hospital computer system.

> "And, it (electronically) is probably slightly better than having a fax because sometimes the faxes don't come through particularly clearly, or pages get stuck, or someone picks up the phone, so coming through electronically, if they can't actually email it to us, that's the next best thing."
>
> Interview Pharmacist 5

> "…it would be nice from an ideal point of view to have the access to the hospital information…I know a lot of hospitals keep e-records now…"
>
> Interview Pharmacist 4

The issues that the community pharmacists have discussed all point towards the problem that they are not included in the list of healthcare professionals that receive the discharge information automatically at the time of hospital discharge. The community pharmacists are in an excellent position to offer advice and ensure that medicines are reconciled after hospital discharge, but this is impossible unless they are aware a patient has been in hospital and they have some idea of how the medicines have been changed. It seems that in some practices the non-medically trained administration staff have better access to discharge information than community pharmacists.

7.3.4.5 Summary of improvements to practical issues

To improve on the current situation requires community pharmacists to have access to the discharge summary and ensure that patients are aware that community pharmacists can support them after a hospital admission. It seems that access to the discharge summary could be relatively easily done using the PharmOutcomes system, as has happened in some locations. A more sophisticated option would be to have a bespoke method for sending discharge summaries to community pharmacies, compatible with IT systems in both the hospital and the community pharmacies. This has been done with great success in East Lancashire, with the Refer to Pharmacy scheme (East Lancashire Hospitals NHS Trust, 2018).

Raising the profile of these post-discharge medication support services could be done by both hospital and community pharmacy staff.

7.3.4.6 Potential attitudinal statements to include in questionnaire:

- Arrangements for medicines-use reviews with patients should use an appointment-based system.
- Community pharmacists should automatically be sent a copy of the patient's discharge summary.
- It would be preferable to send hospital discharge summaries to community pharmacists by fax/PharmOutcomes/email/another electronic method/being able to access hospital pharmacy system (a non-Likert question may be better suited to find out this information).
- Community pharmacists and hospital pharmacists should have two-way processes for communication.
- Community pharmacists require access to the patient's clinical/medical GP record to conduct a PD-MUR.
- There is the right skill-mix in the pharmacy to enable MURs to be conducted.
- MURs are a waste of time.
- MURs are a waste of money.

7.4 Discussion of findings from community pharmacist interviews

The community pharmacist interviews gave a fascinating insight into what it is like to be involved in providing the MUR service at the current time. The pharmacists that were interviewed were strikingly honest in their accounts of the challenges they faced and what measures could be taken to improve the service, not only for themselves but also for patients and GPs.

It is unsurprising that community pharmacists were so easily able to suggest improvements to the PD-MUR system, given that they have such inherent difficulties in identifying suitable patients. The basic lack of discharge information about their patients hampers their efforts to support patients at this vulnerable time. A study of older people in the US found that within 72 hours of discharge, 14.1% of patients had at least one discrepancy in their medication. This contributed to a significantly higher readmission rate ($p=0.04$) within 30 days of discharge,

compared to patients with no medication discrepancies (Coleman *et al.*, 2005). Problems with medicines after discharge have also been found in UK based studies (Latif, Waring, *et al.*, 2018). It is interesting to note that hospital trusts have been required to send discharge information to GP surgeries electronically since 2015, and secure fax is no longer permitted for sending this information (NHS England, 2018a). This directive does not apply to community pharmacies; hence they receive discharge information in an ad hoc and disjointed manner, often by fax. Community pharmacists were given the opportunity in the questionnaire to say what discharge information they required and how they thought it should be sent to them.

This situation is not unique; a survey of 14.4% of community pharmacists in Switzerland assessed the information needs and problems faced by community pharmacists around the time of hospital discharge. The pharmacists surveyed reported a lack of access to all types of information about a patient's hospital discharge (Bruhwiler, Hersberger and Lutters, 2017). Lack of information for community pharmacists at the time of hospital discharge is not a new phenomenon. Over 20 years ago, a survey that included community pharmacists in Scotland found that nearly all of them wanted information about changes in medication made during an in-patient stay, but the majority did not receive this information (Munday *et al.*, 1997). It appears that not much has changed in the intervening period, although pockets of good practice do exist, such as the Refer-to-Pharmacy scheme in north-west England (East Lancashire Hospitals NHS Trust, 2018). The lack of information hampers efforts by community pharmacists to identify patients who have been discharged from hospital and are eligible for PD-MURs or may just require extra support with their medicines.

The perceptions of community pharmacists from GPs and patients also impact on whether patients utilise the services they provide. The lack of involvement of community pharmacists in the discharge information pathway, may be deduced by patients as an endorsement from the wider NHS that pharmacists are not an essential part of the discharge process. A systematic review has shown that patients and the public perceive extended pharmacists' roles to be beneficial but doctors' supremacy, concerns about pharmacists' knowledge and their motives were amongst the barriers to patients use of extended pharmacy services (Hindi, Schafheutle and Jacobs, 2017). This illustrates a missed opportunity for patients. A study of cardiology patients discharged from two hospitals in England showed that patients often chose HCPs, other than pharmacists, to discuss their medicines with, as they felt these others had a 'superior role' in their care or contact was through an appointment-based system. The study

revealed that patients had unmet needs with regard to knowledge about their medicines, whether they were effective and why they should be taken (Gwynn *et al.*, 2014). Pharmacists are able to fulfil these needs if given the opportunity.

GPs appear to be unaware of the services community pharmacists offer when people are discharged from hospital and how these services fit into the overall system. A recent systematic review found that GPs were not aware of the services community pharmacists offered (Hindi, Jacobs and Schafheutle, 2018). In a study of interprofessional collaboration between community pharmacists and GPs in Germany, Löffler *et al.*, (2017) established that community pharmacists felt they were competent in solving medicines-related problems. This view is not necessarily supported by GPs; the systematic review mentioned above found that GPs doubted the competence of community pharmacists and the value of the extended services they provided (Hindi, Jacobs and Schafheutle, 2018).

Despite this, collaboration between community pharmacists and GPs is desired (Kelly *et al.*, 2013) even though existing relationships are perceived to be poor (Hindi, Jacobs and Schafheutle, 2018). A survey of community pharmacists and GPs in Canada concerning collaborative working found that 96.9% of GPs and 99.5% of community pharmacists thought that collaboration between the professions would improve patient outcomes. This was despite 33.5% of GPs and 26.3% of community pharmacists stating that they had never, or rarely collaborated. The barriers to collaborations were lack of time and compensation, and the necessity to deal with multiple pharmacists/GPs (Kelly *et al.*, 2013). Pharmacists are willing and able to support patients after discharge, so embedding them in the discharge process would give them more confidence in their role and wider endorsement of the value of the services they offer. Further research would be required to establish whether embedding community pharmacists into the discharge care pathway would enhance collaboration and improve patient outcomes.

Coupled with this lack of engagement from GPs and patients, is a pressure from some pharmacy companies for pharmacists to complete certain numbers of MURs in a given time period. This is not conducive to pharmacists choosing the patients who have greatest need. PD-MURs tend to take longer and are more complex; this is not reflected in the remuneration, or satisfaction from GPs and patients with the service. It is therefore unsurprising that community pharmacists do not report conducting very many PD-MURs.

The findings and attitudinal statements that have emerged from the community pharmacist interviews were used to provide a rationale for the questions included in the survey of community pharmacists. The survey was able to explore whether the views and experiences of community pharmacists in the interviews were more widely held.

7.5 Strengths and limitations of the community pharmacist interviews

As with any research technique, there are strengths and limitations of the approach taken. For semi-structured interviews, this is no different. The strengths of this part of the study were the ability to gain in-depth information about what it is really like to be a community pharmacist providing the MUR service in England at the current time. The pharmacists gave rich and detailed accounts of their role and were able to pinpoint exactly where problems were present. As the PI did not have any recent experience of working in the community environment, this was invaluable to ensure that the questionnaire was developed based on up-to-date experiences of the target population, rather than assumptions of the PI. This ensured that the questionnaire was relevant and asked the right types of question.

The limitations were due to the relatively small number of participants. Data saturation may not have been reached and those pharmacists who were interviewed may have been in some way different to other community pharmacists, representing volunteer bias. Response bias may have been present if the participants were answering the questions in a certain way because they had a particular 'axe to grind' in relation to the MUR service. All participants worked for large multiples and unfortunately there were no participants from independent pharmacies to establish whether their views and experiences differed.

7.6 Future research

The future research areas to emerge from the interviews would involve further exploration of the issues that the community pharmacists raised; the survey aimed to address some of these outstanding questions. Other potential areas for research could focus on the optimal method for sending discharge summaries to community pharmacists. Also, understanding how sending discharge summaries to community pharmacists affects patients' knowledge about their medicines, levels of medicines reconciliation, adherence and outcomes would provide more robust evidence.

7.7 Summary of the community pharmacist interviews subchapter

The community pharmacist interviews gave a fascinating insight into what it is like to be involved in providing the MUR service. The pharmacists that were interviewed were strikingly honest in their accounts of the challenges they faced and what measures could be taken to improve the service, not only for them but also for patients and other HCPs caring for those patients.

It is unsurprising that community pharmacists were so easily able to suggest improvements to the MUR and particularly the PD-MUR system, given that they are caring for post-discharge patients on a regular basis. The survey will give a larger cohort of community pharmacists the opportunity to share their experiences and opinions about the service. Conducting the interviews ensured that the survey questions were rooted in the lived experiences of those working in current practice.

7.8 Questionnaire Development

The findings of the patient and community pharmacist interviews were used to develop the questions and attitudinal statements for the questionnaire for community pharmacists. This represented an interim phase in the sequential exploratory strategy, following the qualitative phase but preceding the quantitative phase, as shown in Figure 7-8.

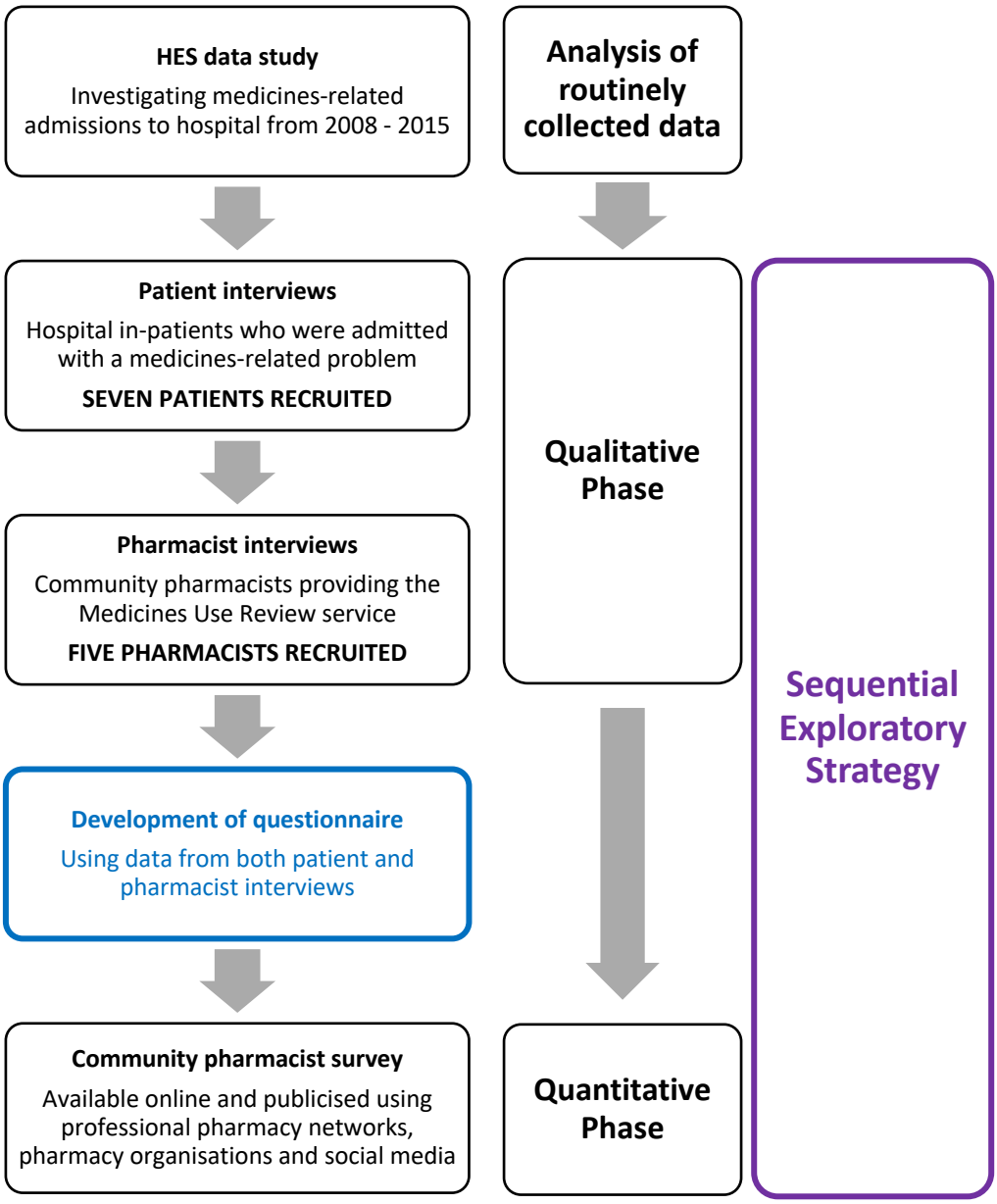


Figure 7-8 Schematic of study – Questionnaire development

7.8.1 Designing the questionnaire

The questions and rationale for including them in the questionnaire are presented in the following sections. There are various strategies that can be employed with the aim of encouraging participants to complete the whole of a questionnaire. They are described below:

- The inclusion of a **variety of different types of questions** to maintain respondents' interest (Oppenheim, 1992). In this study, there were simple closed questions, multiple choice questions, questions asking about quantity, Likert scales and ranking questions as well as the option for free-text responses.
- Having a **variety of open and closed questions** with free-text boxes to allow respondents to add detail to their responses (Boynton and Greenhalgh, 2004).
- **Using closed questions** that are quick to answer, analyse and compare but be aware of a loss of spontaneity of responses (Oppenheim, 1992; Bryman, 2008).
- **Using open questions near the end of the questionnaire**, where respondents can give their own opinions, ideas and theories but being aware that if there are many responses, they can be difficult to analyse and some respondents may find these questions off-putting as they are more work to complete (Oppenheim, 1992; Bryman, 2008).
- **Making the question wording interesting** to hold the respondents' attention (Boynton, 2004).
- **Topic of high interest**, that engage the respondents can result in an increased response rate (Oppenheim, 1992)
- **Putting demographic questions at the end** saying why the information is being collected and how it will be used (Boynton *et al.*, 2004).

These recommendations were considered when designing the questionnaire in terms of the types of questions, their order, how they were worded and how they would be analysed. The following sections summarise the sections included in the questionnaire and the rationale for their inclusion. The full questionnaire can be found in Appendix D.

7.8.2 Community pharmacists' personal experiences of MURs and discharge communication – Questions 1 to 5

The first question asked whether the community pharmacist had ever conducted a MUR. This was a screening question designed to filter out non-community pharmacists and ensure that those pharmacists who went on to complete the questionnaire had experience of the MUR

process. Following on from this question, community pharmacists were asked about their involvement in the MUR service and how they usually found out that one of their patients had been admitted to hospital and whether they ever received any discharge information. These were all information gathering questions that could be analysed separately and also used to give context to the attitudinal statements.

7.8.3 Attitudinal statements – Questions 6 to 9

The list of attitudinal statements that were formulated from the patient and community pharmacist interviews were discussed with the supervisory team and a final list of 31 statements were agreed (see Table 7-1). The statements were presented to community pharmacists with Likert scale options for the responses; strongly agree, agree, neither agree or disagree, disagree and strongly disagree. The attitudinal statements were presented to respondents in a random order in an attempt to remove the possibility of respondents indiscriminately agreeing or disagreeing with all of the statements.

Table 7-1 Attitudinal statements included in questionnaire and their sources

Attitudinal statements	**Source of statement**
Two-way communication is an important part of good relationship with GPs.	Community pharmacist interviews: Theme = Relationships with other healthcare professionals
Community pharmacists are able to build long-lasting trusting relationships with their patients.	Patient interviews: Theme = Relationships Community pharmacist interviews: Theme = Relationships with other healthcare professionals
The majority of patients are aware of the MUR advanced services.	Patient interviews: Theme = Health literacy Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others
Community pharmacists are able to make valuable contributions to patient care through the MUR service.	Patient interviews: Theme = Health literacy
GPs in my local area ask for my advice about medicines-related issues for their patients.	Community pharmacist interviews: Theme = Relationships with other healthcare professionals
Community pharmacists have the right skills to perform high-quality MURs.	Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others
PD-MURs are more complex and time consuming than other types of MURs.	Community pharmacist interviews: Theme = Role in patient safety and education
GPS have a high regard for the contribution that community pharmacists make to the care of their patients.	Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others
Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.	Patient interviews: Theme = Relationships Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others
Community pharmacists cannot conduct MURs properly unless they have access to the patients' GP medical record.	Community pharmacist interviews: Theme = Practical issues
MURs are a waste of time.	Community pharmacist interviews: Theme = Practical issues
Community pharmacists would be able to provide a better service to patients recently discharged from hospital if they could conduct PD-MURs in the patient's home.	Community pharmacist interviews: Theme = Role in patient safety and education
GPs view community pharmacists as just the suppliers of their patients' medicines.	Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others
Hospital pharmacists should promote the PD-MUR service to patients when they are in hospital.	Community pharmacist interviews: Theme = Primary-Secondary care interface issues
GPs know where to find medicines-related information to make safe prescribing decisions.	Community pharmacist interviews: Theme = Role in patient safety and education
MURs are a waste of money.	Community pharmacist interviews: Theme = Practical issues
Patients see community pharmacists as just the suppliers of their medicines.	Patient interviews: Theme = Relationships Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others
I find conducting MURs a satisfying part of my job.	Community pharmacist interviews: Theme = Relationships with other healthcare professionals

Community pharmacists require access to the patient's GP medical records to conduct a PD-MUR.	Community pharmacist interviews: Theme = Practical issues
GPs should refer patients to community pharmacists for MURs.	Community pharmacist interviews: Theme = Relationships with other healthcare professionals
Community pharmacists can provide patients with better information about medication safety and use than GPs.	Community pharmacist interviews: Theme = Role in patient safety and education
I believe that MURs help patients to get the most benefit from their medicines.	Patient interviews: Theme = Health literacy
Community pharmacists should automatically be sent a copy of the patient's discharge summary.	Community pharmacist interviews: Theme = Primary-Secondary care interface issues Community pharmacist interviews: Theme = Practical issues
GPs should feedback to community pharmacists when recommendations are made as a result of a MUR.	Community pharmacist interviews: Theme = Relationships with other healthcare professionals
MURs are not conducted on the patients with the most complex medicines needs.	Community pharmacist interviews: Theme = Role in patient safety and education
Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.	Patient interviews: Theme = Relationships Community pharmacist interviews: Theme = Relationships with other healthcare professionals
Community pharmacists routinely identify major issues relating to patient safety.	Community pharmacist interviews: Theme = Role in patient safety and education
Patients should have to make an appointment with their community pharmacist for a MUR.	Community pharmacist interviews: Theme = Practical issues
Community pharmacists and hospital pharmacists should have a two-way process for communication.	Community pharmacist interviews: Theme = Practical issues
GPs should conduct more thorough medicines reviews for patients, so MURs are not required.	Community pharmacist interviews: Theme = Community pharmacists' views of self and relationships with others Community pharmacist interviews: Theme = Relationships with other healthcare professionals
There is the right skill-mix in the pharmacy to enable MURs to be conducted.	Community pharmacist interviews: Theme = Practical issues

7.8.4 Discharge arrangement questions – Questions 10 to 13

Following on from the attitudinal statements, community pharmacists were asked for more detail about their views of post-discharge medication review in terms of which HCP should conduct a post-discharge medication review, how appropriate each HCP was in conducting a post-discharge medication review, what information they would like when a patient is discharged and how they would prefer to receive this information.

7.8.5 Free text comments – Questions 14 to 15

Next, community pharmacists were given two free text questions where they could leave comments specifically about the discharge process, and also any other more general comments.

7.8.6 Demographic questions – Questions 16 to 22

The final set of questions asked the community pharmacists for some demographic details; again, this was to enable descriptive and inferential statistical analysis of the responses they had given. The respondents were asked to enter details of their gender, year of qualification, whether they worked in other pharmacy sectors, the postcode of their usual pharmacy, whether it was located within a GP surgery and its usual opening hours. Locum pharmacists were screened out before the questions about pharmacy location as it was anticipated that they might work in multiple locations which would make answering the pharmacy specific questions difficult.

7.9 Summary of the questionnaire development subchapter

This chapter has summarised the results of the interviews with community pharmacists and demonstrated how they were used, along with the findings of the patient interviews, to design a questionnaire for community pharmacists. The aim of the questionnaire was to find out about the experiences and attitudes of community pharmacists who provided the MUR service in England. The questionnaire content, format and design were based on evidence from the published literature with the aim of maximising the completion rate from respondents when they accessed the questionnaire.

8 Survey of Community Pharmacists

Chapter Overview

In this chapter, the results of the community pharmacist survey are presented. The chapter starts with a summary of the methods used to collect these data, followed by the descriptive and inferential statistics and that were used to analyse the data and finally a discussion of how these data compare with previously published studies.

8.1 Introduction

As shown in the previous chapter, the findings from the patient interviews and pharmacist interviews were used to develop a questionnaire for community pharmacists. The questionnaire was the quantitative tool used as the final part of the sequential exploratory strategy, see Figure 8-1. It was used to gather data about community pharmacists' experiences of, and attitudes towards, MURs and PD-MURs.

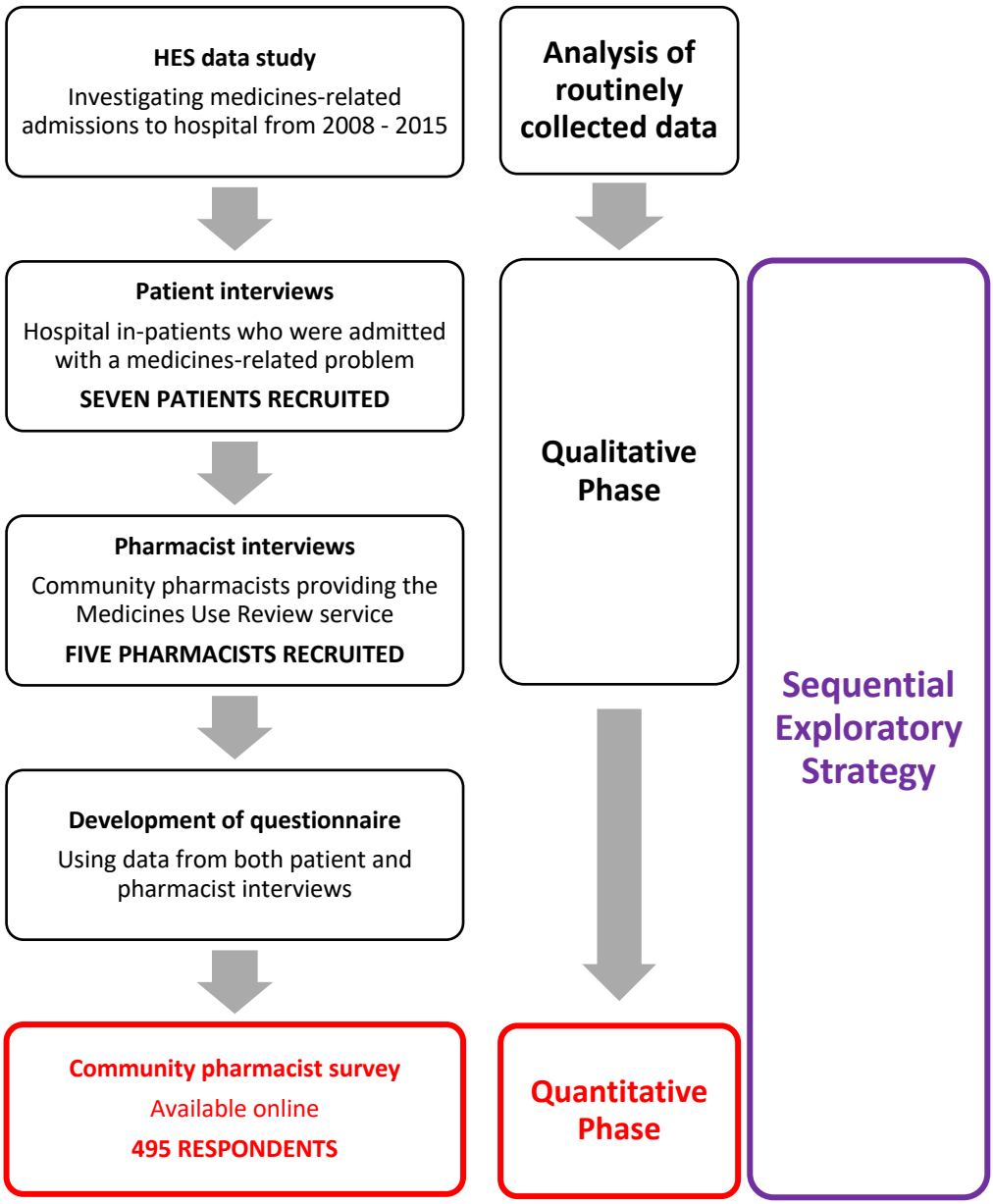


Figure 8-1 Schematic of study - Respondents to survey

8.2 Methods for Survey of Community Pharmacists

This section is focussed on the methods that were used to prepare the questionnaire for use and the recruitment of respondents.

8.2.1 Use of questionnaires as data collection tools

Bryman (2008) has defined survey research as data collected by questionnaire or structured interview from more than one case, at a single point in time (cross-sectional), to gather quantitative or quantifiable data in connection with two or more variables, which are then examined to detect patterns of relationships between the variables (Bryman, 2008). This type of survey would be described as descriptive because the purpose of it is to count, from a sample of the population of interest, how many respondents display an opinion or characteristic. The results can be used to *describe* associations and issues of interest but this type of survey is not designed to determine *causality* or *explain* associations (Oppenheim, 1992; Bowling, 2009).

In this study a self-completion online questionnaire was used as the tool to gather quantitative data. This method of data collection had the advantage of removing interviewer effects and interviewer variability and reduced the chance of social desirability bias. The process was convenient for the respondent as the questionnaires were completed independently (Bryman, 2008). The disadvantages of using self-completion questionnaires are the lack of personal interaction from the researcher to assist or expand the information from the respondent when completing the questionnaire, respondents can become bored and fail to complete questionnaires that are not important to them, only limited numbers and types of questions can be asked so as not to deter respondents and to minimise missing data, and response rates can be low (Bryman, 2008). Nonetheless, self-completion questionnaires allow researchers to gather quantitative data relatively quickly and easily from their population of interest.

8.2.2 Use of online survey software

In this study, online survey software was used to distribute the questionnaire, gather the data and export the data in a format suitable for analysis. Once the content and order of the questions for the survey had been decided, they were formatted into an electronic questionnaire using online survey software from SurveyMonkey (SurveyMonkey Inc., San Mateo, California, USA). This enabled the questionnaire to be made freely available on the internet and links to the questionnaire to be sent out on social media and via email. A paper version of the questionnaire was also generated and offered as a method of response to those who did not want to use the online platform.

There are advantages and disadvantages to using online survey tools, as detailed below:

Advantages:

- **Cost efficiency** – no stationery or postal costs.
- **Time efficient** – no need to print questionnaire, fill envelopes, organise posting, input data.
- **Faster response times** – answers immediately available.
- **No geographical limits** – potential for diverse range of respondents not limited by location.
- **Reach** - larger sample sizes possible compared to paper-based questionnaires.
- **Open questions** – some researchers have found better responses to these questions.
- **Completeness** – some researchers have found fewer missed questions and the software can help to guide respondents to complete the survey correctly.
- **Anonymity and privacy** – perceived anonymity and privacy are high, resulting in reduced social desirability bias and increased candour.

Disadvantages:

- **Response rates** – can be lower than paper-based questionnaires.
- **Online** – responses limited to those who are online.
- **Anonymity and confidentiality** – some respondents may be deterred by concerns.
- **Sample bias** - the whole of population cannot be characterised. Respondents may not be representative of the whole population.
- **Ambiguities in communication** - no linguistic cues from the researcher (this is true for any questionnaire that is completed remotely).
- **Reliability and trustworthiness of data** – individuals may complete the questionnaire multiple times or may not be who they purport to be.

(Bryman, 2008; Hewson and Laurent, 2008; Hewson, 2017)

Despite the potential disadvantages of using an online survey tool, it was decided to use one in this study due to the time and costs involved with accessing an equivalent-sized sample offline, the hope to gather data from community pharmacists throughout England and the potential to have a larger reach. Online and social media publicity methods were used to recruit respondents as described in section 8.2.8.

8.2.3 Ethical considerations of online data collection methods

It has been argued that the ethical considerations of online research are not fundamentally different to that of traditional research tools or offline environments (Markham and Buchanan, 2012). Table 8-1 details the ethical considerations that need to be considered when conducting an online survey and how they were addressed in the current study.

Table 8-1 Ethical considerations of online survey research

Principle (Eynon, Fry and Schroeder, 2017)	**Description (Eynon, Fry and Schroeder, 2017)**	**How it was addressed in this study**
Risk of harm to respondent	The researcher should ensure, as far as practicable, that the respondent does not come to any harm by participating in the research. Harm could include adverse psychological reactions to the research topic or loss of anonymity. It can be difficult for researchers to assess this in an online environment.	It was not anticipated that the study would cause any harm to the respondents as the topic of interest was not sensitive or personal.
Risk of harm to researcher	The researcher may discover distressing or harmful information and must then decide if or how they act on it.	Nothing of this nature was disclosed but if it had, it would have been discussed with the supervisory team.
Confidentiality / anonymity	Respondents have a right to expect confidentiality and anonymity if it has been promised. This is important for all stages of the data collection and research process.	Respondents were able to complete the questionnaire anonymously and had the option to add their email address if they wished to enter the prize draw. Participants were asked for their pharmacy postcode, but this was only used to determine the urban or rural location of the pharmacy and not used to identify the pharmacy. Confidentiality was maintained by storing and analysing the data securely.
Informed consent	Potential respondents must have access to sufficient information to ensure that they are able to make an informed decision about participating in any research. They must be able to access additional information if they wish and have the ability to withdraw from the study if they wish. In online environments it is not possible to check the person's ability to give informed consent.	The survey was intended for community pharmacists who would have the capacity to provide informed consent. Participant information was available on the second page of the questionnaire, with the contact details of the research team so they could access additional information if necessary. Consent was presumed by completion of the questionnaire. Respondents were given details of how they could withdraw from the study.

8.2.4 Questionnaire formatting and design considerations

When formatting and designing the layout and style of the questionnaire, there were a variety of factors to consider with the aim of maximising the number of respondents. Published texts (Oppenheim, 1992; Boynton, 2004; Boynton and Greenhalgh, 2004; Bryman, 2008) are focussed on paper-based tools rather than electronic tools, but some principles to maximise the response rate can still be applied. Table 8-2 details the factors that have been shown to affect response rates to questionnaire surveys and how they were addressed in the current study.

Table 8-2 Factors affecting questionnaire survey response rate

Factor	Evidence to increase response rate	Considerations for this study
Piloting and testing	The questionnaire should have been through this process before distribution (Boynton, 2004).	The questionnaire was piloted prior to use, see section 8.2.6.
Advanced publicity	Informing potential respondents of the questionnaire (Oppenheim, 1992).	A study blog and Twitter were used to publicise the study and questionnaire prior to period of data collection.
Purpose	The aims of the questionnaire are explained clearly and the questionnaire has a defined purpose (Boynton, 2004).	The study information was included on the first page of the questionnaire, summarised on the study blog and linked to social media posts.
Further information	A member of the research team is able to respond to any questions (Boynton, 2004).	Contact details for the research team were included on the first page of the questionnaire, summarised on the study blog and linked to social media posts. Instructions on how to withdraw from the study were included on the second page of the questionnaire, and respondents could access this from the original weblink they used to access the questionnaire.
Sponsorship	Sponsorship by an organisation can be a motivator for respondent completion (Oppenheim, 1992).	The University logo was included on all pages of the questionnaire.
Confidentiality and anonymity	Only the researcher team will have access to participant responses and no identifiable information will be published (Oppenheim, 1992).	Confidentiality and anonymity were guaranteed to respondents. They had free choice about whether to enter their email for the prize draw and this was not linked to their responses.
Length of questionnaire	If too long, respondents will be deterred from completion (Bryman, 2008)	The questionnaire was as succinct as possible; 24 questions over 14 pages. An estimation of the time to complete the questionnaire was included on the first page. A progress bar was included so respondents had a visual cue of progress.
Questionnaire layout and appearance	The questionnaire should have a clear design, simple layout and be visually appealing (Oppenheim, 1992; Boynton, 2004; Bryman, 2008).	Ensured sufficient clear space around questions so layout was uncluttered. Pleasing accent colour scheme (pale blue) chosen.
Instructions for completion	Need to be clear and easy to follow (Boynton and Greenhalgh, 2004; Bryman, 2008).	Instructions for completion included prior to each question.
Wayfinding	Ensures that instructions for routing or the skipping of excluded questions are easy to follow (Boynton *et al.*, 2004). Although this is more important for paper rather than electronic questionnaires.	Questionnaire tested to ensure that skipping of questions occurred correctly depending on respondent's previous answers.
Reminders	Can be used to encourage potential respondents to complete the questionnaire (Oppenheim, 1992).	Blog and social media used to publicise study at frequent intervals when questionnaire was live.
Incentives	Completion of the questionnaire offers respondents an incentive or chance to win a prize (Oppenheim, 1992; Boynton, 2004).	Optional prize draw for respondents to enter.

8.2.5 Reliability and validity of the questionnaire

When designing questionnaires, their reliability and validity must be considered. For a tool to be valid, a prerequisite is that it must also be reliable (Oppenheim, 1992; Bryman, 2008). Reliability refers to the consistency of the tool in measuring the construct it is designed to measure. It includes not only the characteristics of the tool but also the way it is administered (Oppenheim, 1992); so tools that are reliable should give consistent results from repeated samples administered by different researchers over time (Boynton and Greenhalgh, 2004). There are three main factors that can be used to establish whether a tool is reliable:

- **Stability** – testing and retesting whether a measure is stable over time in the same cohort of respondents (Bryman, 2008). This method was not used in this study.
- **Internal reliability** – whether respondents scores on a particular item are related to their scores on another item (Bryman, 2008); this is most commonly used for questions with Likert scale responses (Laerd Statistics, 2018). This can be tested using Cronbach's alpha, which estimates reliability by investigating all possible correlations between items on a scale (Bowling, 2009). This measure has been used in this study and is discussed in more detail in section 8.6.5.
- **Inter-observer consistency** – when more than one observer is involved in a study, the consistency of their decisions could affect reliability (Bryman, 2008). This was not applicable to this study.

Validity refers to whether the tool actually measures what it intends, or is supposed to measure (Oppenheim, 1992). Ideally, a previously validated tool should be used, but often this is not possible as such a tool does not exist. There are various types of validity, some of which are presented here:

- **Face validity** refers to whether the researcher or others with relevant experience assess that the tool is actually measuring the item of interest (Bryman, 2008; Bowling, 2009). This was assessed by the PI and the supervisory team.
- **Content validity** aims to establish that the questions represent a balanced way of examining the full area of interest (Oppenheim, 1992; Bowling, 2009). This was assessed by the PI, the supervisory team and two national pharmacy organisations, see section 8.2.8.1.
- **Construct validity** uses a hypothesis to predict how the tool will perform and examines the data to test whether the hypothesis is correct (Bowling, 2009).

8.2.6 Piloting the questionnaire

Once the content and format of the questionnaire had been finalised, the plan was for it to be piloted, as shown in Figure 8-2.

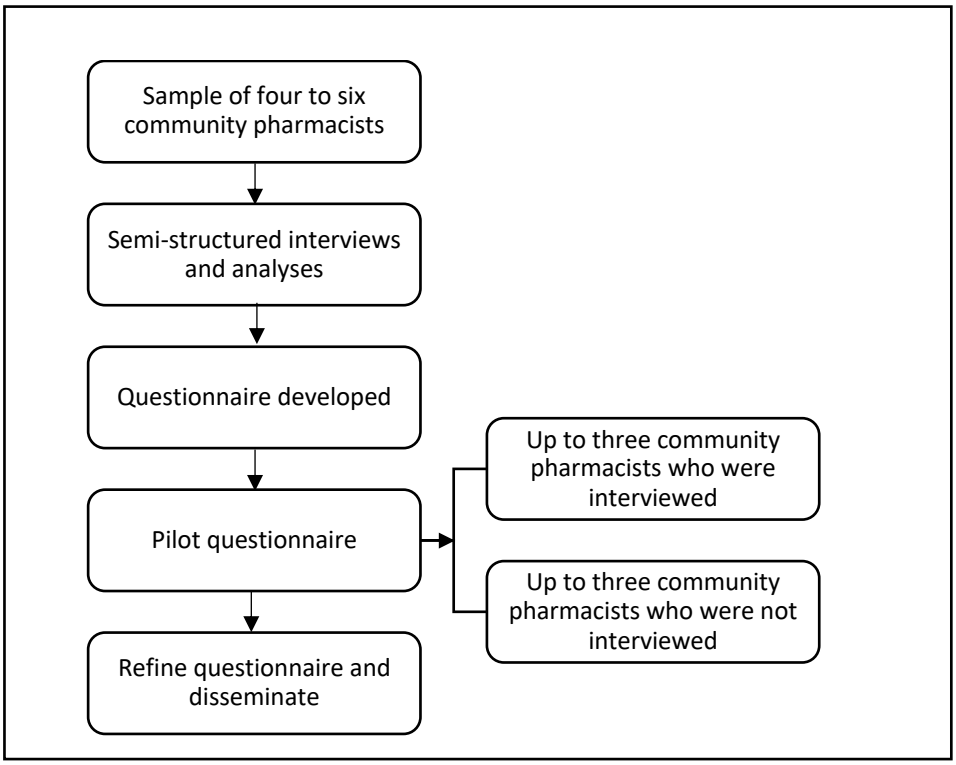


Figure 8-2 Community pharmacist progression through the study

When the community pharmacists were interviewed, they had been asked if they were prepared to be involved in piloting the finalised questionnaire; all agreed. All five community pharmacists were contacted and four replied positively. Three requested a weblink to pilot the survey online and one requested a paper version. Two pharmacists who had shown an interest in being interviewed but had not participated in an interview were also contacted but did not respond. A small purposively selected sample of five community pharmacists, who had not previously participated in the study, were also contacted and one response was received to complete the pilot online. The link to the online pilot questionnaire was also shared with the three members of the supervisory team.

Six pharmacists accessed the pilot questionnaire and completed it to varying degrees. As the pilot questionnaire was completed anonymously in SurveyMonkey it was not possible to definitely say how many were pharmacists that had been interviewed or not. However, it was

possible to identify that of the six; two had been interviewed, one had not, and for the remaining three it was unclear if they had already been involved with the study.

Community pharmacists who completed the pilot questionnaire were asked for comments about aspects of the questionnaire that worked well, any problems encountered and comments about the time for completion. One pharmacist responded that some of the statements with Likert responses swapped from being positively to negatively phrased; this was intentional to ensure that respondents thought about the statements rather than just completing them without thinking. The other comments were more general and thought the questionnaire was focussed on a useful topic. The piloting showed that the questionnaire logistics worked in both electronic and paper formats and the questionnaire took on average 16 minutes to complete.

8.2.7 Sampling

In this study, an online survey tool was chosen to distribute the questionnaire. As there was not access to online contact details for the whole community pharmacist population in England it was not possible to use a probability (random) sampling method to recruit respondents. Therefore, a non-probability, or convenience sampling approach was used (Bowling, 2009; Fricker, 2017). Within this approach two subtypes of sampling were used: 'unrestricted, self-selected' sampling and snowballing (Bowling, 2009; Fricker, 2017). 'Unrestricted, self-selected' sampling describes the fact that the survey was accessible online to anyone who had access to the link; participants were self-selected and had to choose to 'opt-in' (Fricker, 2017). Snowballing (Bowling, 2009) was used by promoting the study on social media sites such as Twitter and LinkedIn and hoping that other users (particularly influential people in the pharmacy profession) shared the study details, thus recruiting more respondents.

8.2.8 Recruitment of respondents

Recruitment and distribution of the questionnaire to community pharmacists was through pharmacy organisations, contractors, professional networks and social media.

8.2.8.1 National pharmacy organisations and contractors

With the aim of ensuring the questionnaire survey reached as many community pharmacists as possible, national pharmacy organisations and community pharmacy contractors were contacted to facilitate the publicity of the study and the distribution of the electronic questionnaire link. Four national pharmacy organisations, of the six contacted, agreed:

- The Pharmaceutical Services Negotiating Committee (PSNC).
- The National Pharmacy Association (NPA).
- Association of Independent Multiple Pharmacies (AiMP).
- The PDA (Pharmacists' Defence Association) – approached and agreed to help publicise the study after it was live.

Four contractors, of the nine contacted, agreed:

- Boots.
- Well.
- Rowlands.
- Day Lewis.

One national pharmacy organisation (the PSNC) and one contractor (Boots) wanted to review the questionnaire and approve its contents before they assisted with the distribution of the electronic link to their members or employees.

- **Boots** requested that the questionnaire went through their research approval process, which was akin to the ethical approval process of the University. The feedback from Boots was resolved through correspondence, clarifying the rational for certain decisions such as question order. Minor formatting and explanations of abbreviations were included in the revised version of the questionnaire.
- **The PSNC** gave feedback about the order of the questions and this was resolved by talking to the organisation and making minor changes to the order of the Likert statements.

For all the above organisations, a message was written by the PI and sent to the contact at the organisation for them to distribute as they saw best. The method of distribution was outside of the control of the PI, but the PI was aware of email distribution and messages posted on internal websites for some organisations. The PSNC posted information about the study on their homepage on the first working day the study was live, see Appendix D for screenshots.

As previously agreed with the NHS Ethics Committee who granted the original ethics approval, the questionnaire was submitted for final ethics approval, which was granted, see section 4.3.2 and appendix B.

8.2.8.2 Professional networks and social media

As well as enlisting the help of the pharmacy organisations detailed above, professional networks and social media were also used to publicise the study and achieve a greater reach.

- **Professional networks**
    - **The RPS** agreed to facilitate with publicity for the study and tweeted the study details to their followers. They also posted the details of the study on their Community Pharmacy and Research and Evaluation networks message boards. A message was also posted by the PI on to the message boards of the 35 local practice forum (LPF) groups in England which included a link to the questionnaire and the blog.
    - **The LPCs** were also contacted by the PI, and of the 64 LPCs in England that were contacted, 46 responded to say they were willing to publicise the study to their members.
    - A post was also placed on the **Pharmacy Forum** (https://www.pharmacy-forum.co.uk) locum page containing a link to the questionnaire. This was an attempt to include locum pharmacists in the study who may not have been aware of the study through other routes such as employers.
- **Blog**
    - A blog (https://thepaperstudy.wordpress.com) was also created by the PI. It included information and updates about the study, and the details of the PI and study team. A blog post was written when the survey went live and included a survey link.
- **Social Media**
    - **Twitter** (www.twitter.com) was used by the PI who posted regular tweets whilst the questionnaire was live. Other pharmacists on Twitter also retweeted these messages to their followers.
    - The PI posted a message on **LinkedIn** (www.linkedin.com) and the post was shared twice by a member of the supervisory team with >500 connections.

8.2.9 Completion of the questionnaire

Participants who clicked the link to access the study were taken to the first page of the questionnaire which gave them a one-line summary of the study, how long it should take to complete and details of the prize draw. The prize draw was included as an incentive to complete the questionnaire. First prize was a £25 Amazon voucher and there were two runner-up prizes of £10 Amazon vouchers. Pharmacists who completed their details at the end of the questionnaire could enter the draw and winners were informed by email after the questionnaire had closed. The voucher was then sent to them as an electronic link. The questionnaire was open for four weeks. During this time, the PDA agreed to publicise the study (see promotional email sent to PDA members in Appendix D), so the study remained open for an additional three weeks and a second prize draw, identical to the first, was offered for pharmacists who responded during this additional time period.

When respondents clicked to the second page of the questionnaire, they were presented with the approved participant information sheet, which contained the full details of the study and the contact details for the PI and supervisory team. If they continued and clicked to the following page, they were presented with the questionnaire. Consent was presumed by the completion of the questionnaire. If pharmacists had wanted to withdraw from the study, they could contact a member of the study team (details were available from the link they used to access the questionnaire or via the blog). Their responses would have been removed from the analysis, but no respondents requested that.

8.2.10 Statistical analysis plan for the questionnaire survey

When the survey had closed, the data collected in SurveyMonkey were automatically transferred into IBM SPSS Statistics (IBM Statistical Package for the Social Sciences, version 24). The results of the survey were analysed using descriptive statistics, inferential statistics and factor analysis (see section 8.6 for more details of this technique) [1], in SPSS. An analysis plan for the survey responses was written and is presented in appendix E.

The responses entered into the SurveyMonkey software were stored there until the analysis was complete, before being deleted. A copy of the anonymised survey results will be stored

[1] Factor analysis analyses quantitative data and tries to elucidate if there are underlying attitudes that affect how people behave in a given situation.

securely on a password-protected computer for a period of five years and then deleted. If any paper questionnaires had been completed, they would have been stored securely on NHS premises for a period of five years after the study was completed. After this time, they would have been shredded as confidential waste.

8.2.11 Level of significance

A p-value of <0.01 was selected as the level for showing statistical significance, due to the number of tests performed.

8.3 Survey results

8.3.1 Eligibility to complete questionnaire and number of responses received

Four hundred and ninety-five community pharmacists started the questionnaire and of those, 353 completed all questions with the remainder partially completing the questionnaire. All respondents completed the electronic version of the questionnaire that was available online; no respondents requested a paper copy of the questionnaire.

As the questionnaire link was sent out via community pharmacy contractors, national pharmacy organisations, professional networks and promoted on social media platforms, it was not possible to calculate a response rate as the denominator was unknown. The General Pharmaceutical Council (GPhC) Workforce census (Phelps *et al.*, 2014) surveyed approximately two thirds of all registered pharmacists in 2013, approximately 76.4% (34,190) of the 44,751 registered pharmacists were working in England, and of those 64% (21,882) were working in community pharmacy settings only. A rough estimate suggests that this sample represents approximately 2.3% of the total community pharmacist workforce in England; acknowledging that the total number of registered pharmacists will have changed since the workforce census was completed in 2013.

The first question in the survey asked whether the community pharmacist had personally carried out a MUR. Four hundred and eighty-three pharmacists (97.6%) responded ‘yes’ and were eligible to complete the remainder of the questionnaire. Twelve pharmacists (2.4%) responded ‘no’ and were therefore ineligible to complete the survey; they were directed to a page that thanked them for their interest in the study and explained that they were not able to complete the remainder of the questionnaire.

8.4 Descriptive statistical analysis

8.4.1.1 Gender

The sex distribution of the respondents was 145 (40.5%) male and 204 (57.0%) female, while 9 (2.5%) preferred not to disclose this information (n=358). These results appear to be comparable with the registered pharmacist population from 2013 (Phelps *et al.*, 2014) which found that, of the sample surveyed, 39.6% of registered pharmacists were male and 60.4% female.

8.4.1.2 Year of registration

Respondents were asked which year they first registered as pharmacists, either with the Royal Pharmaceutical Society of Great Britain (RPSGB) or the GPhC. The responses to this question were then used to estimate the age of the pharmacists and compared with the 2013 Workforce census data. This assumes that the pharmacist registered at the age of 22, if registration occurred in 2001 or earlier, and age 23, if registration occurred in 2002 or later due to the change from the Bachelor of Pharmacy (BPharm) to the Master of Pharmacy (MPharm) degree.

Table 8-3 Age of community pharmacist respondents to questionnaire survey compared to GPhC Workforce census 2013

Age band	**Questionnaire survey respondents (n=312)**	**GPhC Workforce census 2013 Percentages stated only (n=30,040)***
Less than 30	84 (26.9%)	21.6%
30 – 39	97 (31.1%)	31.9%
40 – 49	63 (20.2%)	22.4%
50 – 59	48 (15.4%)	17.4%
60 and over	20 (6.4%)	6.8%

*Workforce census sampled 30,040 of 44,751 registered pharmacists in 2013
Totals do not always add to 100% due to rounding

This shows that there were a higher percentage of pharmacists under the age of 30 completing the questionnaire, but the percentage of pharmacists in other age bands were broadly similar when compared to the 2013 Workforce census.

The year of qualification was also used to determine whether the pharmacists qualified with a BPharm degree or a MPharm degree. In 1997 the degree course was changed from a 3-year BPharm degree to a 4-year MPharm degree; the first MPharm cohort graduated in 2001 and registered with the RPSGB in 2002. Of the respondents (n=312), 139 (44.6%) graduated with a BPharm degree and 173 (55.4%) graduated with a MPharm degree.

Likewise, the year of qualification was used to determine whether pharmacists qualified before or after the introduction of the new community pharmacy contract in April 2005, which heralded the introduction of MURs. Of the respondents, 159 (51.0%) qualified before the

introduction of the contract and 153 (49.0%) qualified after the introduction of the new contract.

The reason for stratifying the pharmacists into these groups was to enable further analysis to be conducted to discover whether the duration someone had been qualified as a pharmacist had any bearing on their attitudes towards and experiences of providing MUR services.

8.4.1.3 Locum work

Respondents were asked about whether their main role was working as a locum pharmacist. It was anticipated that locum pharmacists may work in various different locations. Eighty pharmacists (22.3%) responded that they were locums and 279 (77.7%) were not (n=359). Locum pharmacists were given the opportunity to enter the prize draw, but they were not asked to enter details of the pharmacies they worked in.

8.4.1.4 Other pharmacy sector working

Respondents were asked what sectors of pharmacy they worked in. As this was a survey of community pharmacists, unsurprisingly all pharmacists reported that they worked in community settings, but 65 pharmacists also reported working in other sectors. Figure 8-3 shows the other sectors that community pharmacists also worked in. Respondents who stated 'other' mainly reported working for LPCs or other pharmacy organisations.

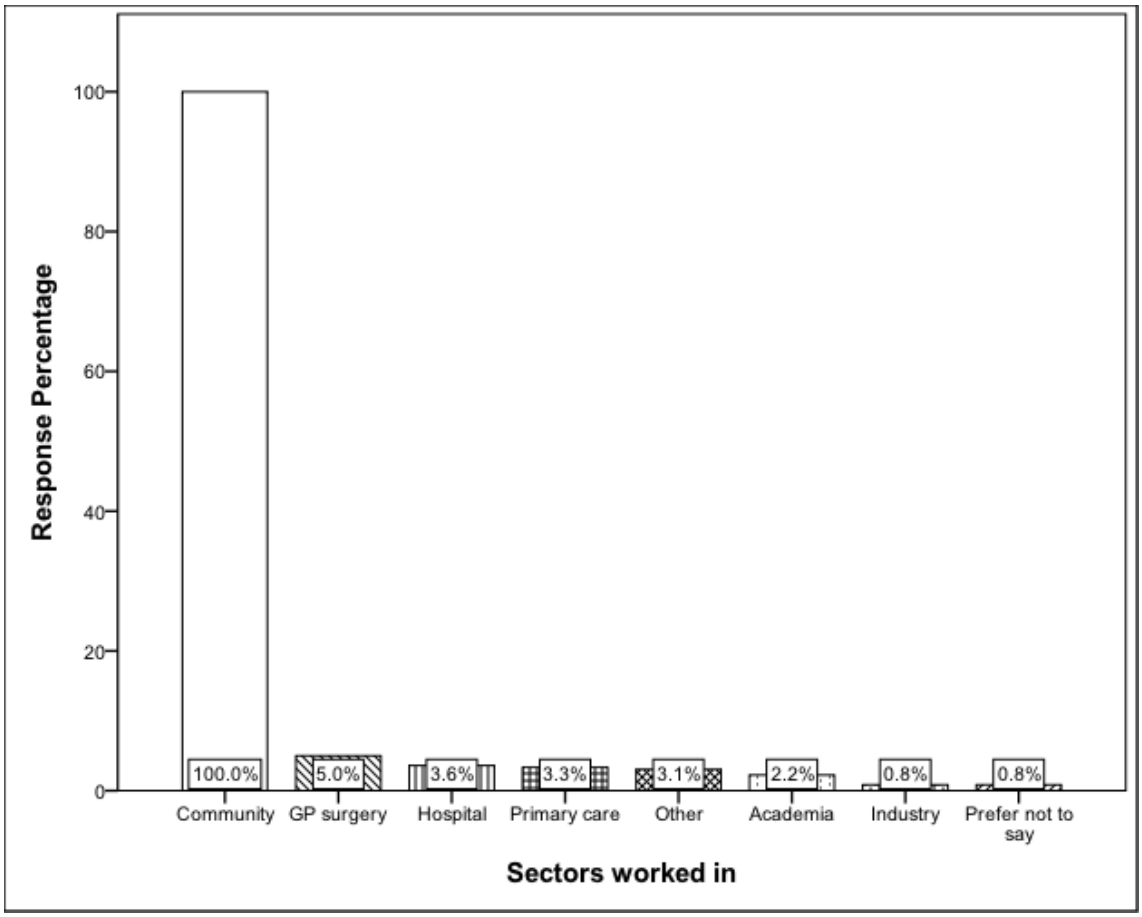


Figure 8-3 Sectors of pharmacy currently worked in (n=359)

8.4.1.5 Pharmacy location

Pharmacists were asked about the location of the pharmacy that they usually worked in. The location was denoted by the respondent entering the postcode of the pharmacy. If they were not able to remember the postcode, they were invited to enter the address. Postcodes or address details were entered by 235 respondents. The postcode (or the postcode derived from the address details) was entered into the Office for National Statistics (ONS) Postcode Directory look-up service (ONS, 2017a) and this allowed the location of the pharmacy to be categorised as being in an urban or rural location.

Of the respondents who completed location information for their pharmacy (n=235), 200 (85.1%) pharmacies were located in urban areas and 35 (14.9%) in rural areas.

8.4.1.6 Type of pharmacy

Respondents were asked about the type of pharmacy that they usually worked in. The responses are summarised in Figure 8-4. The majority of pharmacists (65.2%) worked for large multiples with the remainder working in other types of pharmacies.

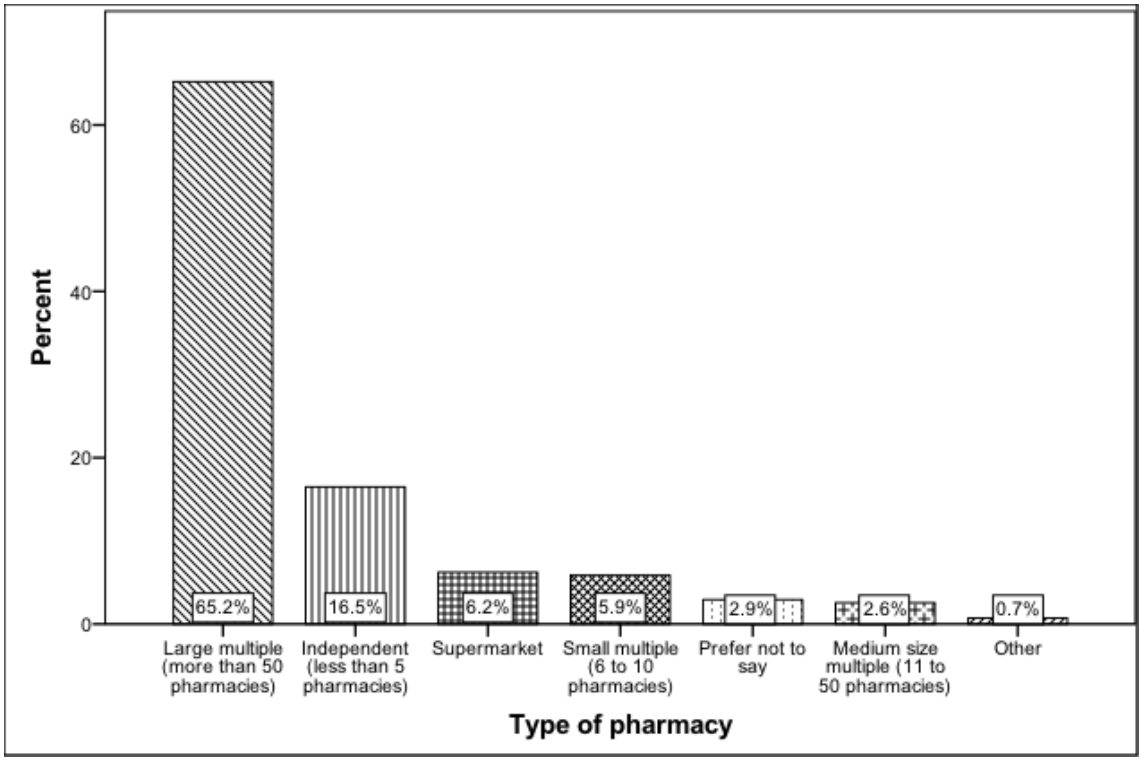


Figure 8-4 Type of pharmacy worked in (n=273)

8.4.1.7 Co-location of pharmacy within GP surgery

Respondents were asked whether the community pharmacy they usually worked in was located within a GP surgery. Of the 274 pharmacists who answered this question, 39 (14.2%) worked in a pharmacy within a GP surgery and 4 (1.5%) worked in a pharmacy adjacent to a GP surgery. The remaining 231 (84.3%) respondents reported that the pharmacy they usually worked in was not within or adjacent to a GP surgery.

8.4.1.8 Opening hours of the pharmacy

Respondents were asked how many hours their pharmacy was open each week. The responses are shown in Figure 8-5. The majority of pharmacists (56.6%) worked in pharmacies that were open for 50 to 99 hours per week, with a smaller proportion (32.5%) working in pharmacies

open for less than 50 hours per week and the minority (10.2%) open for more than 100 hours per week.

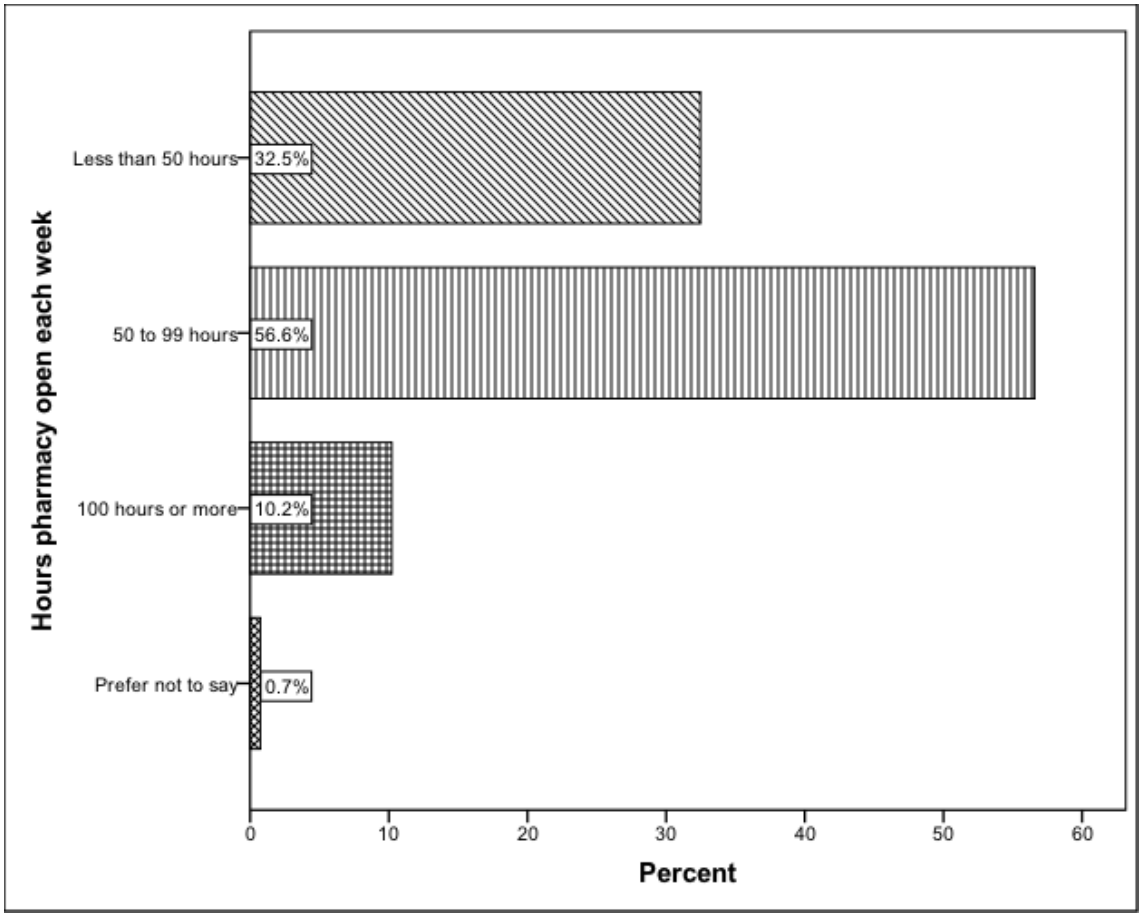


Figure 8-5 Pharmacy opening hours (n=274)

8.4.2 Number of prescription items dispensed

The postcode was used to determine the number of prescription items that were dispensed in a one-month period. The NHS Business Services Authority publishes monthly prescription data for every pharmacy in England on its website as it is deemed to be in the public interest (NHS Business Services Authority, 2018). The postcode of the pharmacy that the respondent entered into the questionnaire was searchable in the monthly spreadsheet, and the number of prescription items dispensed (on both paper and electronic prescription forms) could be recorded. The data for October 2017 are shown in Figure 8-6. The data for the number of prescriptions dispensed could only be found for 179 of the 235 pharmacies where postcode or address information was provided. This was because in some circumstances it was not possible to identify the pharmacy from the address details entered; when no postcode was supplied, if the postcode was incomplete and therefore covered an area that was too large to identify the

pharmacy, or if the postcode was incorrect, and no pharmacy could be confidently identified. The results showed that the majority of pharmacies (87.1%) dispensed under 20 000 items per month.

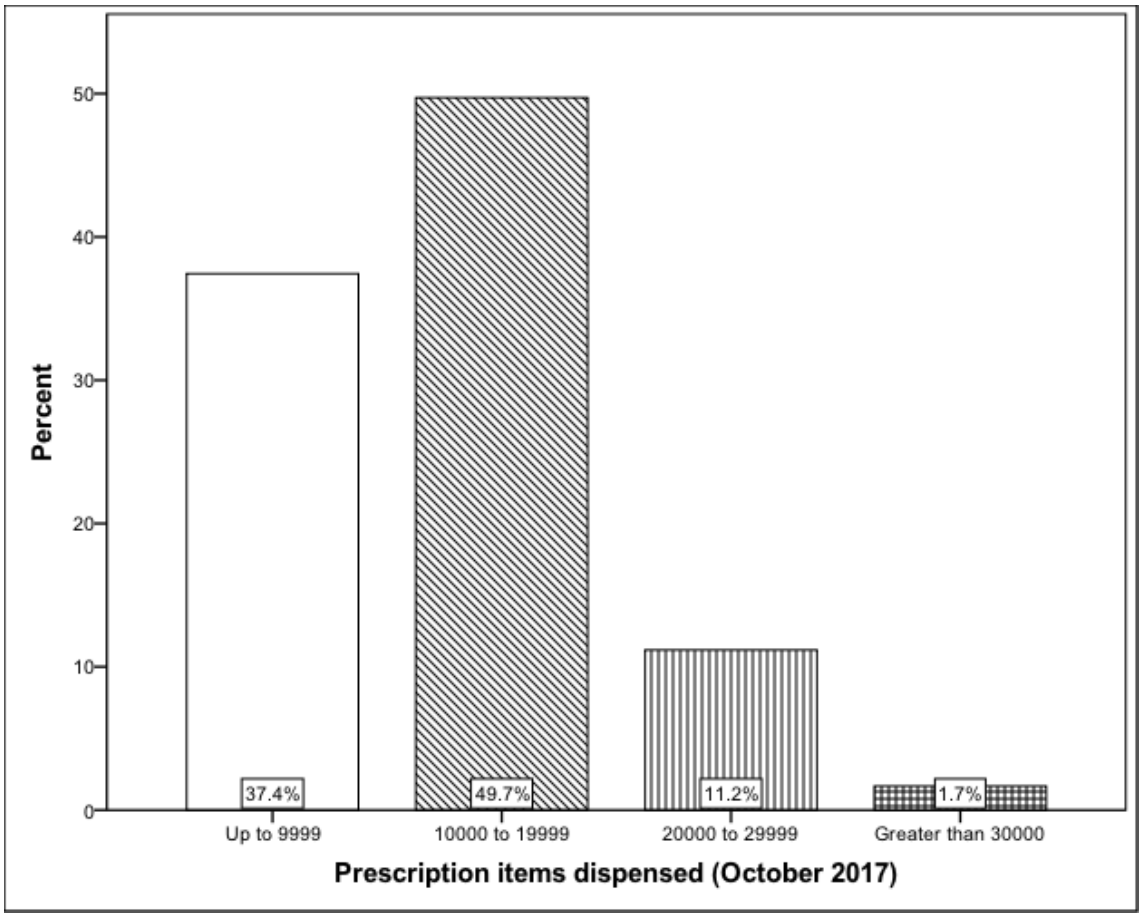


Figure 8-6 Prescription items dispensed (n=179)

8.4.3 Involvement in MUR services

Respondents were asked to estimate the number of MURs they had completed in the previous month; the results are shown in Table 8-4. There was a broadly even spread of responses to this question.

Table 8-4 Community pharmacists' estimation of the number of MURs completed in the previous month (n=439)

Number of MURs completed in previous month	Frequency	Percentage
Up to 10	117	26.7
11 to 20	74	16.9
21 to 30	116	26.4
More than 30	105	23.9
Prefer not to say	10	2.3
Other	17	3.9

Percentage total >100% due to rounding.

Community pharmacists were then asked to estimate what percentage of these MURs were PD-MURs. More than half of the pharmacists reported that they had not conducted any PD-MURs in the previous month.

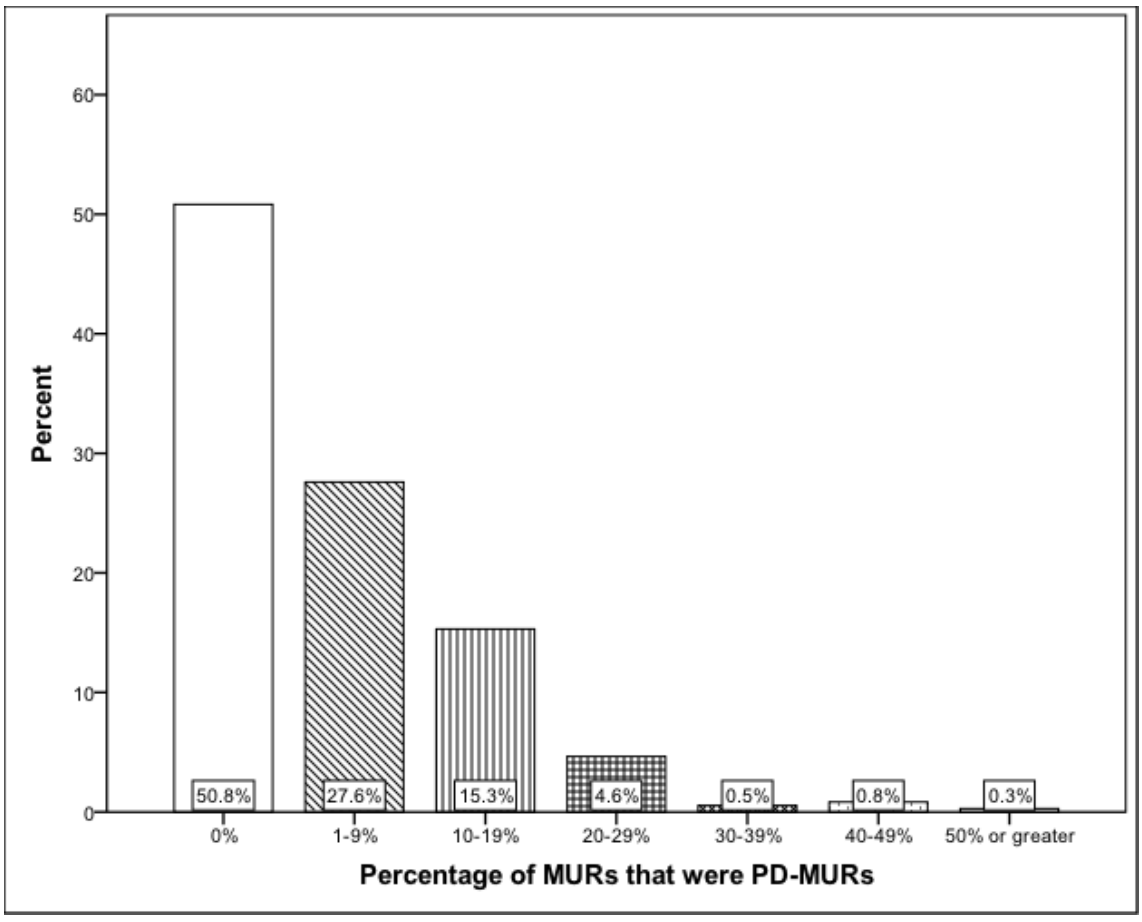


Figure 8-7 Percentage of MURs that were PD-MURs (n=366)

8.4.4 Communication when patients are in hospital

8.4.4.1 Who informs community pharmacists that their patients are in hospital

Respondents were asked about who informed them when one of their patients had been admitted to hospital.

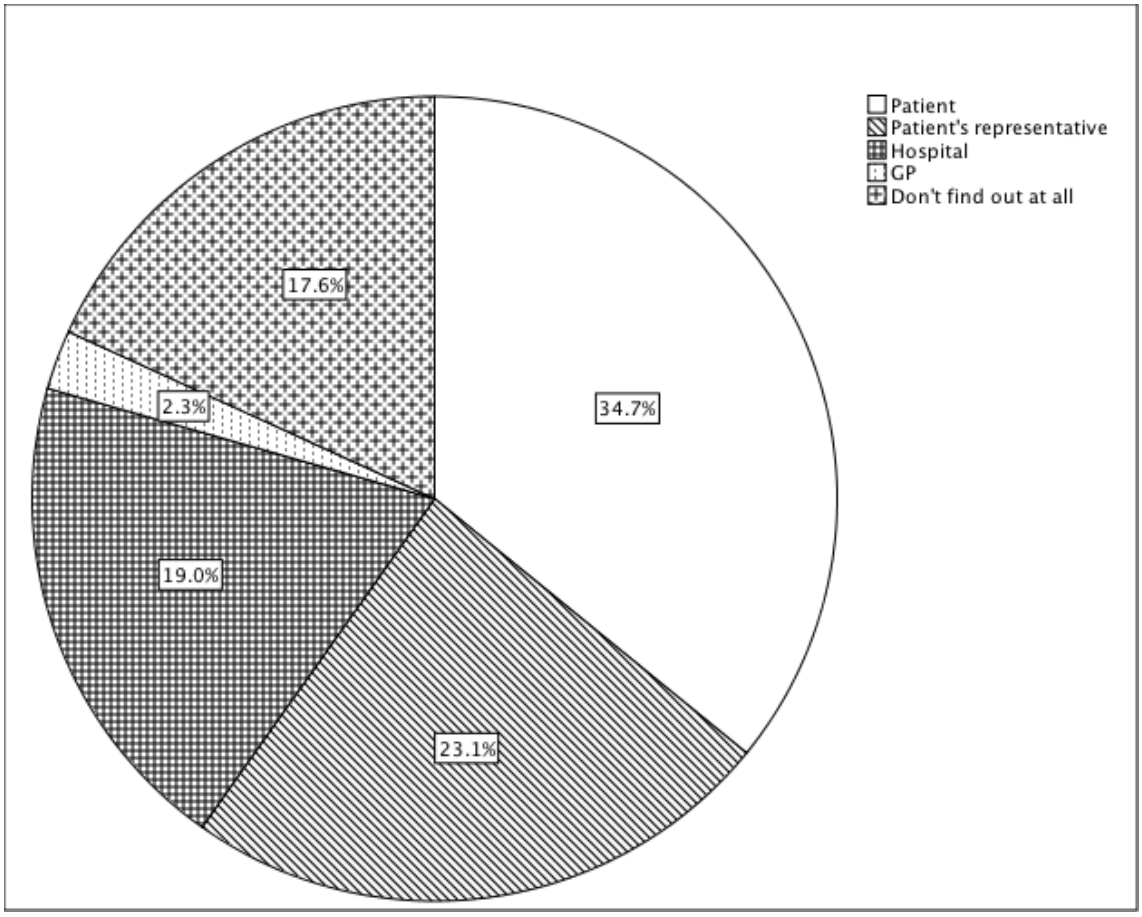


Figure 8-8 Who informs community pharmacist when a patient is admitted to hospital (n=432)

It is quite reassuring to note that in the majority of cases (79.1%) the community pharmacist does find out that one of their regular patients has been admitted to hospital. This shows that when the pharmacist is informed it is often in an ad hoc manner. It also does not take into account when they find out, as often this may be after the patient has been discharged.

8.4.4.2 How community pharmacists are informed their patients are in hospital

Following on from the previous question, respondents were asked *how* they were usually informed that one of their patients had been admitted to hospital. They were able to select as many different ways as they had experienced.

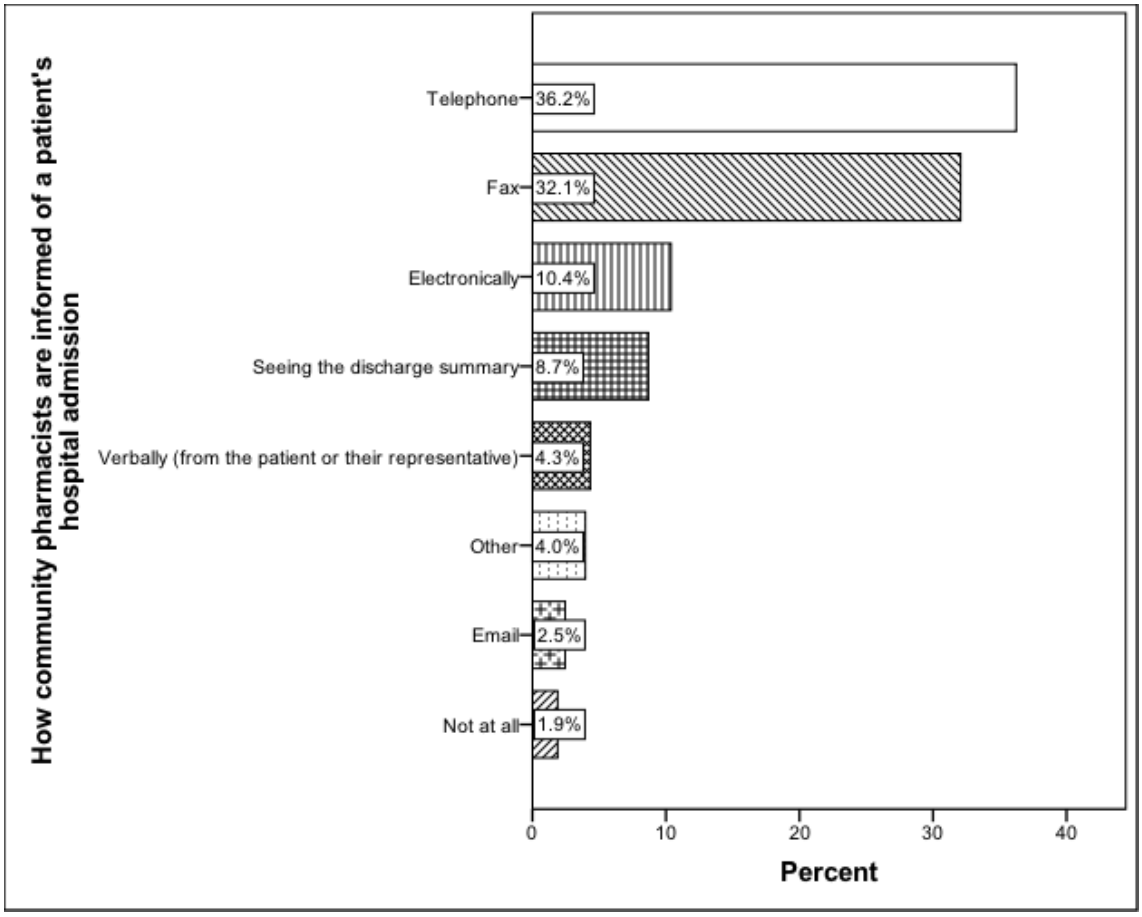


Figure 8-9 How community pharmacists are notified their patients are in hospital (534 responses from n=364)

This shows that at the time of this study (September 2017), telephone and fax communication are still the most common ways that a community pharmacist finds out that one of their patients has been admitted to hospital. Very few pharmacists reported that they were notified by electronic means. The category denoted 'other' included: noticing that the prescription had changed, picking up a problem with the patient's prescription, finding out accidently or by using the SCR.

8.4.4.3 Most appropriate healthcare professional to conduct post-discharge medication reviews

Participants were asked about which single healthcare professional would be most appropriate to conduct a medication review after someone had been in hospital.

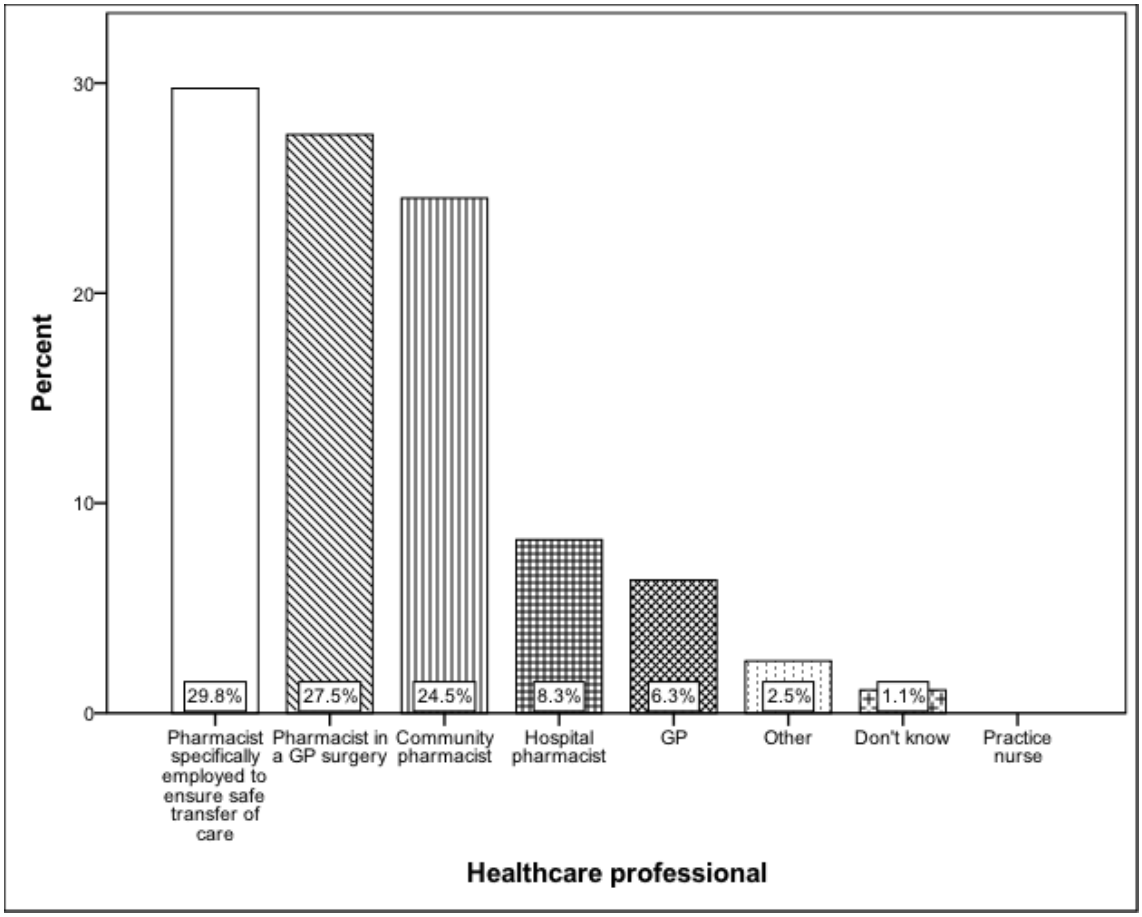


Figure 8-10 Most appropriate healthcare professional to conduct a medication review after hospital discharge (n=363)

Community pharmacists overwhelming thought that a pharmacist would be the best HCP to conduct post-discharge medication reviews; 90.1% expressed that view. However, there was disagreement about the optimal role, with community pharmacists undecided between choosing pharmacists specifically employed to ensure safe transfer of care, pharmacists working in a GP surgery or community pharmacists. They also thought a hospital pharmacist would be preferable to a GP.

Respondents who selected 'other' suggested that it should be the healthcare professional that knows the patient best, it depended on why the patient had been in hospital, or a combination of different healthcare professionals would be best.

Respondents were then asked to rate each healthcare professional to gauge whether they considered each HCP to be appropriate to conduct a post-discharge medication review.

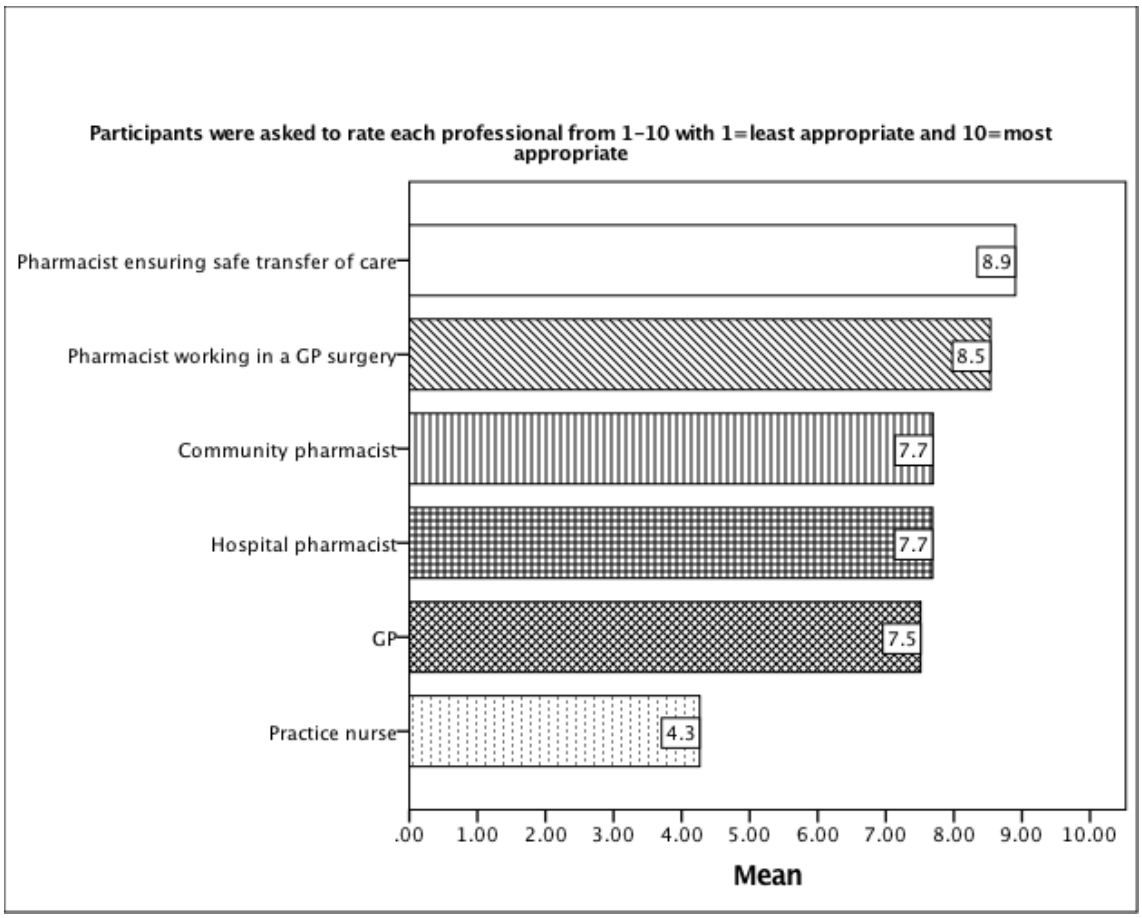


Figure 8-11 Community pharmacists' rating of most appropriate healthcare professional to conduct a post-discharge medication review (n=351-361)

Interestingly, no pharmacists thought a practice nurse would be the most appropriate healthcare professional to conduct a PD-MUR. However, when asked to rate the appropriateness of a practice nurse conducting this task, they still gave them a score of 4.3 out of 10, meaning they did think practice nurses could be appropriate to some degree.

Community pharmacists rated themselves with the same appropriateness as hospital pharmacists and GPs for conducting this task.

8.4.4.4 What information community pharmacists require on hospital discharge

When respondents were asked what information they required when one of their patients was discharged from hospital, they responded overwhelmingly that they would like a copy of the full hospital discharge summary, as shown in Figure 8-12.

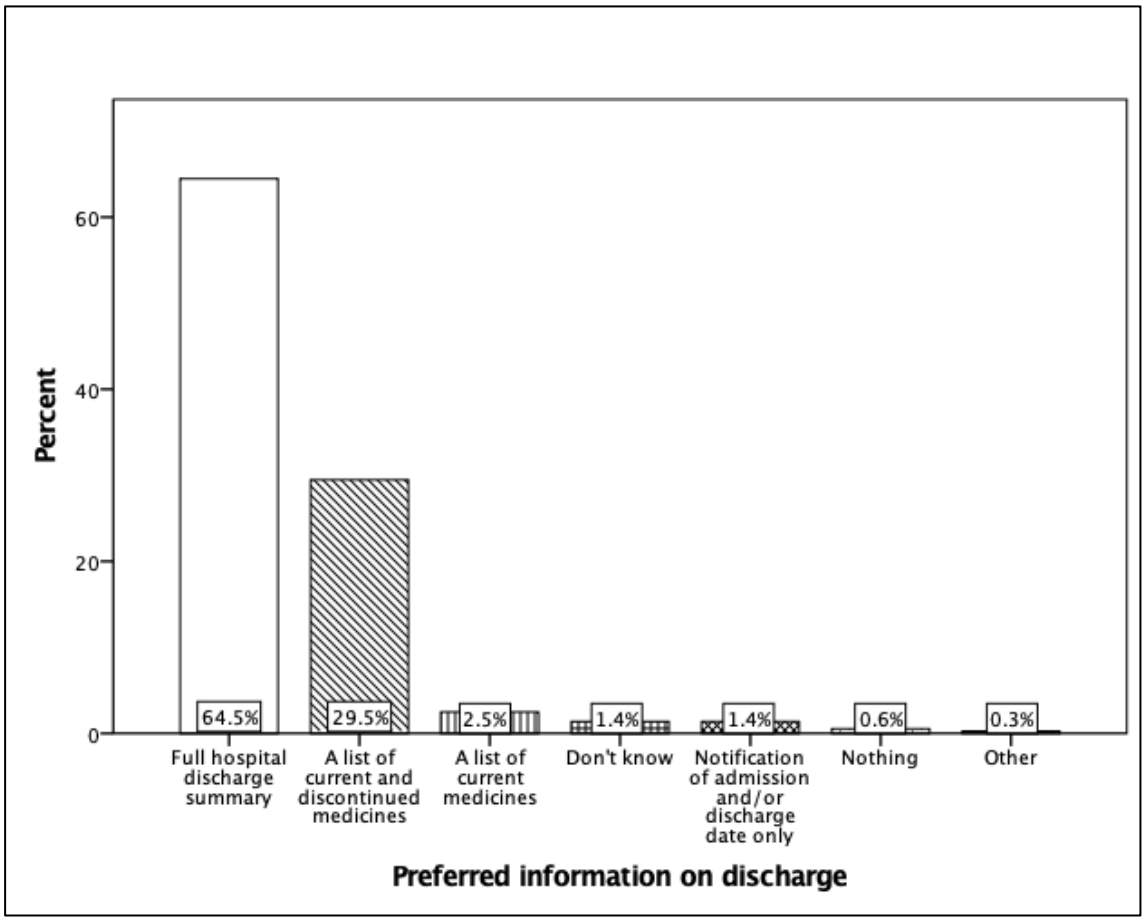


Figure 8-12 Information community pharmacists would prefer on discharge (n=363)

The respondents who stated 'other' felt that they only required discharge information for patients who used compliance aids.

8.4.4.5 How community pharmacists would like to be informed of a patient's discharge

Respondents were asked how they would prefer to receive discharge information.

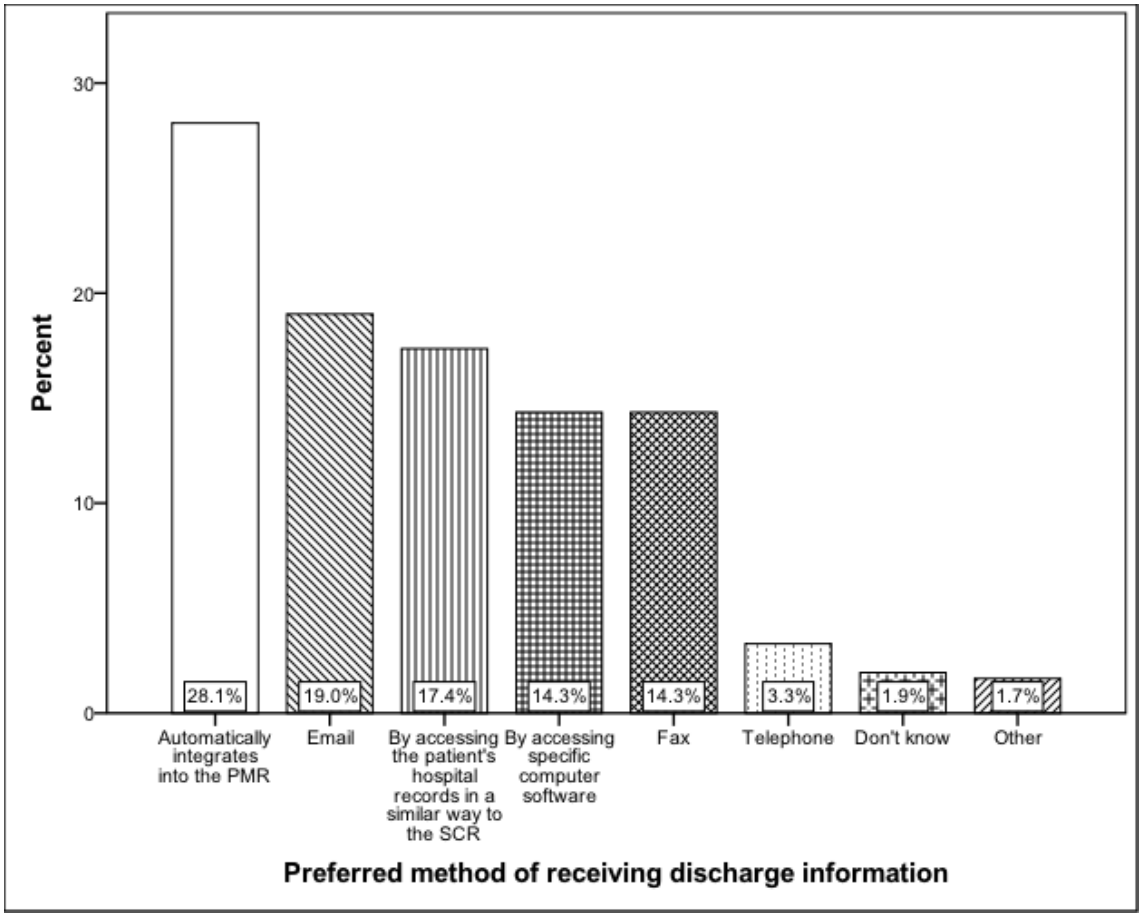


Figure 8-13 How community pharmacists would prefer to receive discharge information (n=363)

The majority (78.8%) thought it would be best if it was sent by some electronic means, with most responding to say they would prefer for it to integrated directly into their patient medication record (PMR).

8.4.4.6 Responses to Likert statements

The attitudes of the community pharmacists to the Likert statements they were presented with are summarised in Tables 8.5, 8.6, 8.7 and 8.8. Any statements where more than 70% of respondents shared the same overall opinion, i.e. strongly agree + agree or strongly disagree + disagree, are highlighted blue in the tables; this figure was chosen arbitrarily just to give a flavour of the responses where most respondents concurred. The highlighted statements show that community pharmacists feel they have the skills to provide additional services to patients

and contribute to the primary healthcare team, but that this is dependent on relationships and communication with others such as GPs and the patients themselves.

Table 8-5 Reponses to Likert statements – Question 6

Question 6	Strongly Agree		Agree		Neither agree or disagree		Disagree		Strongly disagree		Don't know		n
Two-way communication is an important part of a good relationship with GPs.	80.6%	333	17.2%	71	1.2%	5	0.5%	2	0.2%	1	0.2%	1	413
Community pharmacists are able to build long-lasting trusted relationships with their patients.	73.0%	302	22.0%	91	3.1%	13	1.7%	7	0.2%	1	0.0%	0	414
The majority of patients are aware of the MUR advanced services.	6.1%	25	25.9%	107	22.3%	92	34.6%	143	10.2%	42	1.0%	4	413
Community pharmacists are able to make valuable contributions to patient care through the MUR service.	38.5%	159	39.5%	163	11.4%	47	5.1%	21	5.6%	23	0.0%	0	413
GPs in my local area ask for my advice about medicines-related issues for their patients.	10.4%	43	39.6%	164	19.8%	82	15.0%	62	13.5%	56	1.7%	7	414
Community pharmacists have the right skills to perform high-quality MURs.	49.2%	203	34.9%	144	10.2%	42	4.1%	17	1.5%	6	0.2%	1	413
PD-MURs are more complex and time consuming than other types of MURs.	16.8%	69	28.6%	118	27.4%	113	10.9%	45	1.5%	6	14.8%	61	412
GPs have a high regard for the contribution that community pharmacists make to the care of their patients.	4.9%	20	13.6%	56	28.2%	116	27.7%	114	19.2%	79	6.3%	26	411

Table 8-6 Responses to Likert statements – Question 7

Question 7	Strongly Agree		Agree		Neither agree or disagree		Disagree		Strongly disagree		Don't know		n
Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.	29.6%	117	48.1%	190	11.1%	44	8.4%	33	2.3%	9	0.5%	2	395
Community pharmacists cannot conduct MURs properly unless they have access to the patient's GP medical record.	12.9%	51	28.8%	114	21.7%	86	31.6%	125	4.8%	19	0.3%	1	396
MURs are a waste of time.	8.2%	32	9.0%	35	18.7%	73	28.9%	113	34.5%	135	0.8%	3	391
Community pharmacists would be able to provide a better service to patients recently discharged from hospital if they could conduct PD-MURs in the patient's home.	17.2%	68	35.4%	140	24.5%	97	11.9%	47	4.3%	17	6.8%	27	396
GPs view community pharmacists as just the suppliers of their patients' medicines.	18.7%	74	38.2%	151	22.0%	87	14.7%	58	3.5%	14	2.8%	11	395
Hospital pharmacists should promote the PD-MUR service to patients when they are in hospital.	43.9%	173	42.6%	168	6.9%	27	1.8%	7	2.3%	9	2.5%	10	394
GPs know where to find medicines-related information to make safe prescribing decisions.	9.1%	36	45.2%	179	26.3%	104	10.1%	40	2.5%	10	6.8%	27	396
MURs are a waste of money.	11.7%	46	10.9%	43	18.7%	74	25.8%	102	30.6%	121	2.3%	9	395

Table 8-7 Responses to Likert statements – Question 8

Question 8	Strongly Agree		Agree		Neither agree or disagree		Disagree		Strongly disagree		Don't know		n
Patients see community pharmacists as just the suppliers of their medicines.	8.9%	34	26.3%	100	16.5%	63	37.3%	142	10.2%	39	0.8%	3	381
I find conducting MURs a satisfying part of my job.	26.4%	101	39.0%	149	14.4%	55	12.0%	46	8.1%	31	0.0%	0	382
Community pharmacists require access to the patient's GP medical record to conduct a PD-MUR.	17.8%	68	37.2%	142	17.8%	68	17.5%	67	2.1%	8	7.6%	29	382
GPs should refer patients to community pharmacists for MURs.	37.1%	142	44.1%	169	10.4%	40	5.5%	21	2.6%	10	0.3%	1	383
Community pharmacists can provide patients with better information about medicine safety and use than GPs.	30.4%	116	43.7%	167	18.3%	70	4.7%	18	2.4%	9	0.5%	2	382
I believe that MURs help patients to get the most benefit from their medicines.	33.4%	127	47.6%	181	10.3%	39	4.0%	15	4.5%	17	0.3%	1	380
Community pharmacists should automatically be sent a copy of the patient's discharge summary.	56.5%	216	32.5%	124	6.5%	25	2.6%	10	1.8%	7	0.0%	0	382
GPs should provide feedback to community pharmacists when recommendations are made as the result of a MUR.	44.1%	169	46.5%	178	7.6%	29	1.3%	5	0.5%	2	0.0%	0	383

Table 8-8 Responses to Likert statements – Question 9

Question 9	Strongly Agree		Agree		Neither agree or disagree		Disagree		Strongly disagree		Don't know		n
MURs are not conducted on patients with the most complex medicines needs.	12.9%	48	28.2%	105	21.2%	79	27.1%	101	9.7%	36	1.1%	4	373
Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.	21.4%	80	52.4%	196	17.7%	66	5.4%	20	1.9%	7	1.3%	5	374
Community pharmacists routinely identify major issues relating to patient safety.	17.7%	66	50.4%	188	20.6%	77	9.4%	35	1.6%	6	0.3%	1	373
Patients should have to make an appointment with their community pharmacist for a MUR.	7.8%	29	20.4%	76	23.3%	87	34.1%	127	14.2%	53	0.3%	1	373
Community pharmacists and hospital pharmacists should have a two-way process for communication.	49.6%	185	44.2%	165	4.0%	15	1.3%	5	0.3%	1	0.5%	2	373
GPs should conduct more thorough medicines reviews for patients, so MURs are not required.	10.0%	37	11.9%	44	27.5%	102	31.0%	115	18.6%	69	1.1%	4	371
There is the right skill-mix in the pharmacy to enable MURs to be conducted.	22.5%	84	43.6%	163	13.9%	52	13.9%	52	6.2%	23	0.0%	0	374
MURs are not conducted on patients with the most complex medicines needs.	12.9%	48	28.2%	105	21.2%	79	27.1%	101	9.7%	36	1.1%	4	373

8.5 Inferential statistical analysis

Following on from the descriptive analyses of the survey responses, bivariate analyses were conducted to establish whether there were any relationships between the independent and dependent variables. The analyses plan (see Appendix E) detailed the analyses that were conducted using these data.

8.5.1 Independent and dependent variables for statistical tests

The independent variables for the statistical tests were the demographic responses that community pharmacists had entered into the questionnaire, or they were derived from their responses. The independent variables that fell into this category were: gender, degree type, qualification before or after the introduction of the new pharmacy contract in 2005, urban or rural location, type of pharmacy, opening hours, sectors of pharmacy worked in, whether they also worked in a GP surgery, whether the pharmacy was located in a GP surgery and the number of prescription items dispensed.

The dependent variables were: the number of MURs conducted in the previous month, the proportion of MURs that were PD-MURs in the previous month, the attitudes to the statements scored on Likert scales, the most appropriate HCP to conduct a post-discharge medication review, the information required following a hospital discharge and how information should be sent following discharge. More detail on these variables can be seen in Appendix E. In the following section, only statistical tests that generated significant results are reported.

8.5.2 Relationships between independent variables and number of MURs conducted

The respondents self-reported an estimate of the number of MURs they had conducted in the previous month. Rather than asking for exact numbers, respondents were given a range of categorised options: up to 10, 11 to 20, 21 to 30, or more than 30 MURs per month. For this reason, the data were treated as ordinal data for the purposes of the statistical analysis. The data were analysed against the independent variables detailed above.

8.5.2.1 Number of MURs conducted by year qualified

The year of qualification was split into a dichotomous variable of whether the pharmacist had qualified with a BPharm or MPharm degree (changed in 2001) or whether they had qualified before or after the introduction of the new community pharmacy contract (introduced in April 2005).

Degree type

A Mann-Whitney U test revealed a statistically significant difference in the number of MURs conducted by pharmacists who graduated with a BPharm (median 11 to 20 MURs per month, n=138) or MPharm degree (median 21 to 30 MURs per month, n=172), U=9527, z=-3.083, p=0.002, r=0.175. r denotes the size of the effect with 0.1 = small effect, 0.3 = medium effect and 0.5 = large effect (p.233) (Pallant, 2016). This means that pharmacists who qualified in 2002 or later conducted more MURs per month than those who qualified before 2002, but the effect was small.

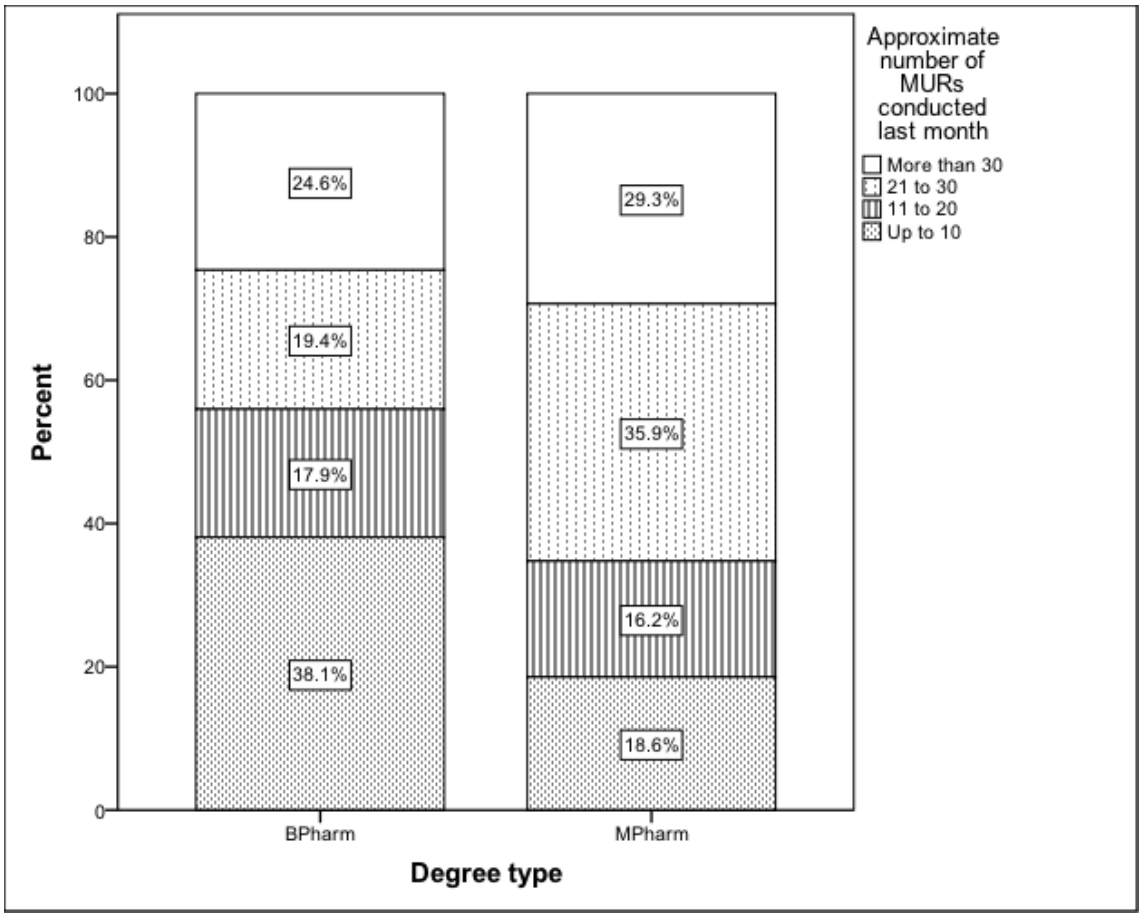


Figure 8-14 Estimated number of MURs conducted last month by degree type (n=310)

Qualified pre- or post- introduction of new community pharmacy contract

As this grouping is virtually the same as classifying pharmacists by degree type, it is unsurprising that a Mann-Whitney U test found a statistically significant difference in the number of MURs conducted by pharmacists who qualified before the introduction of the new community pharmacy contract in 2005 (median 11 to 20 MURs per month, n=158) or afterwards (median 21 to 30 MURs per month, n=152), U=9791, z=-2.903, p=0.004, r=0.17.

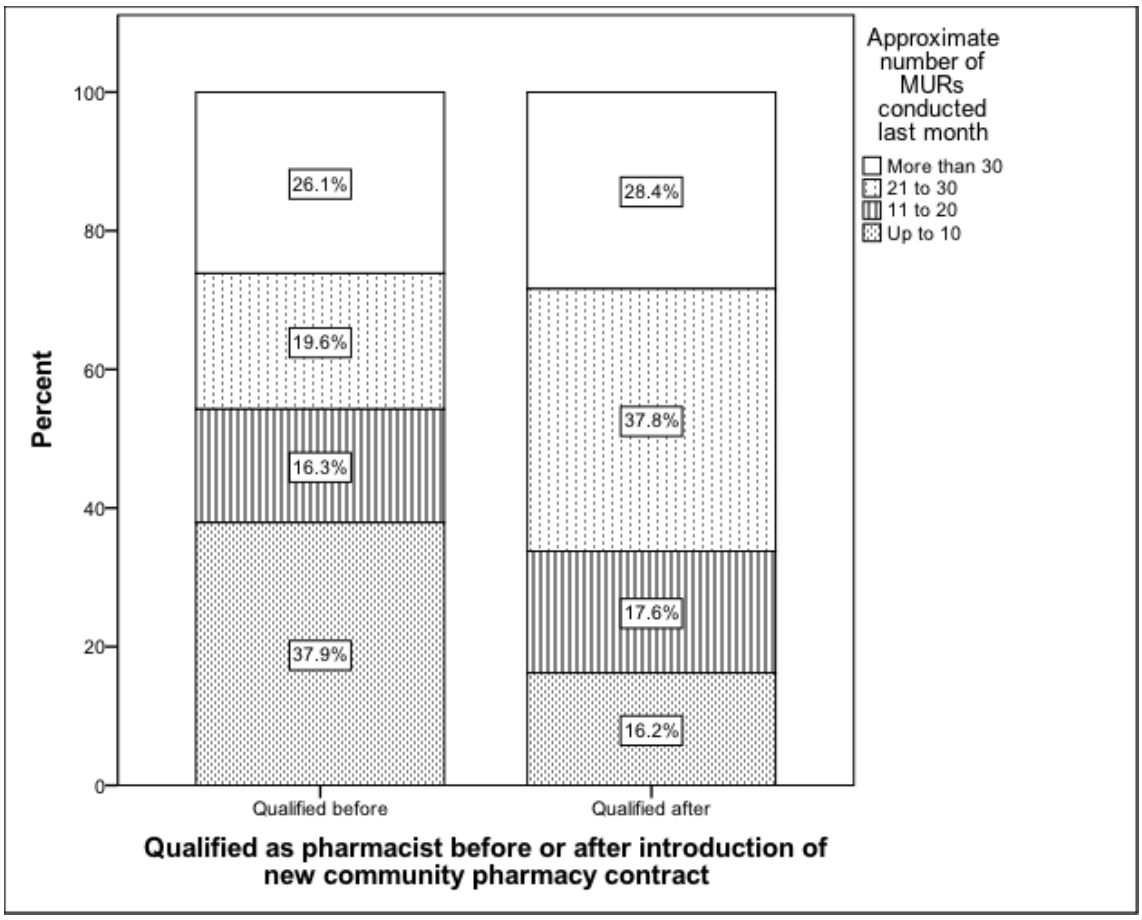


Figure 8-15 Estimated number of MURs conducted last month by qualification date (n=310)

8.5.2.2 Number of MURs conducted by pharmacy type

A Kruskal-Wallis Test revealed a statistically significant difference in the number of MURs conducted across different types of pharmacy.

Table 8-9 Estimated number of MURs conducted by pharmacy type (n=261)

Pharmacy type	**Number of responses**	**Estimated number of MURs conducted last month (Median)**
Independent (<5 pharmacies)	44	11-20
Small multiple (6-10 pharmacies)	16	Equally split between categories 11-20 and 21-30
Medium multiple (11-50 pharmacies)	7	21-30
Large multiple (>50 pharmacies)	177	21-30
Supermarket	17	11-20

χ^2 (4, n=261) =15.704, p=0.003

Mann-Whitney U tests were conducted to interrogate the data further and they revealed that there was a statistically significant difference in the number of MURs conducted in the previous month by pharmacists in independent pharmacies (median 11-20, n=44) compared to large multiples (median 21-30, n=177), U=2724.000, z=-3.209, p=0.001, r=0.2. Also, there was a statistically significant difference in the number of MURs conducted by pharmacists in large multiples (median 21-30, n=177) compared to supermarkets (median 11-20, n=17), U=962.000, z=-2.565, p=0.01, r=0.18.

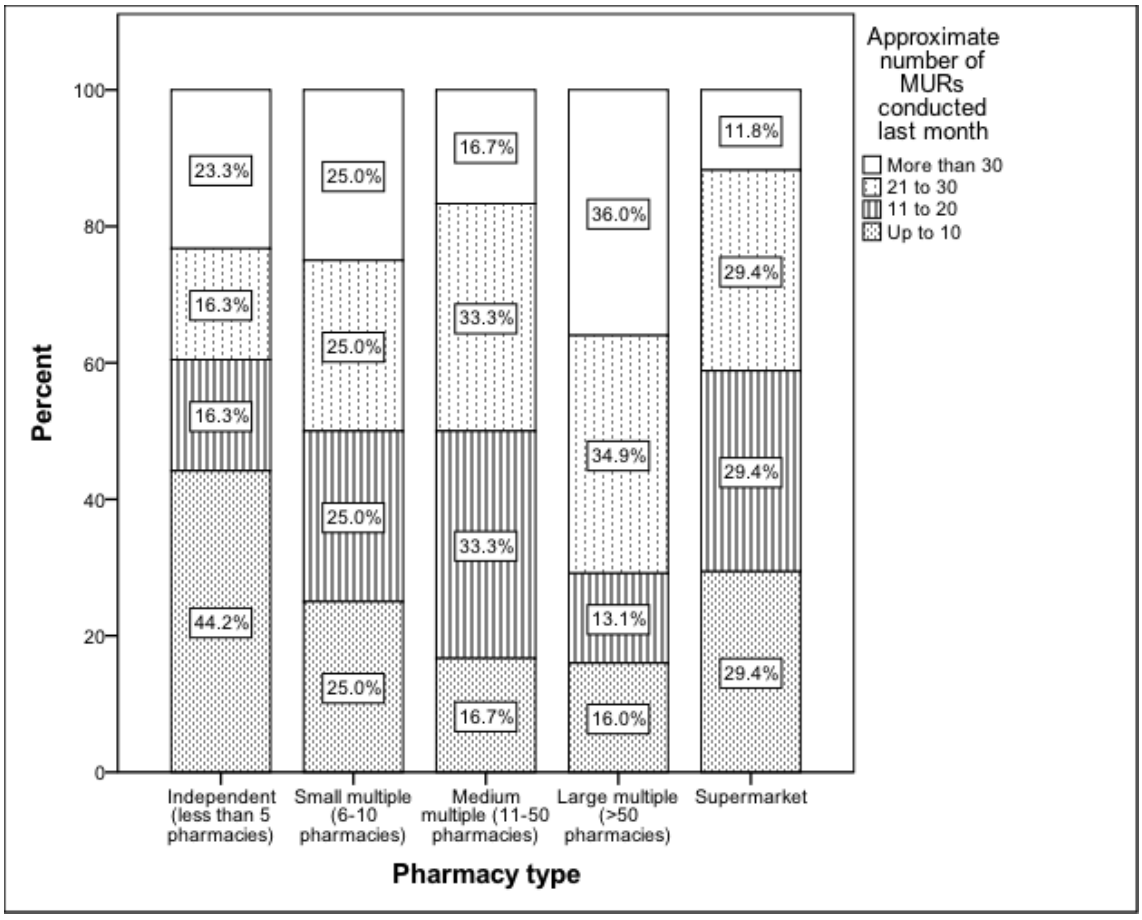


Figure 8-16 Estimated number of MURs conducted last month by pharmacy type (n=261)

8.5.2.3 Breakdown of MURs conducted by pharmacists in large multiples comparing urban and rural areas

The group of pharmacists working in large multiple pharmacies was much larger (n=177) than other categories. A sub-group analysis of the respondents who worked in large multiples was conducted to investigate whether there was any difference in the number of MURs conducted dependent on an urban or rural location. A Mann-Whitney U test showed that there was a statistically significant difference in the number of MURs conducted by pharmacists working for large multiples in rural areas (median >30, n=25) compared to those working in urban areas (median 21-30, n=129), U=1107.500, z=-2.613, p=0.009, r=0.2.

Table 8-10 Number of MURs conducted last month by pharmacists working for large multiples stratified by location (n=154)

	Number of MURs conducted in previous month			
	Up to 10	11-20	21-30	More than 30
Urban area	19 (14.7%)	17 (13.2%)	49 (38.0%)	43 (33.3%)
Rural area	3 (12.0%)	0 (0.0%)	6 (24.0%)	15 (60.0%)
Totals	22 (14.3%)	17 (11.0%)	55 (35.7%)	58 (37.7%)

8.5.2.4 Number of MURs by number of prescription items dispensed

The relationship between the number of MURs conducted in the previous month and the number of prescription items dispensed in October 2017 was investigated using Spearman's rho correlation coefficient. A very weak correlation was found between these two variables, r=0.189, n=179, p=0.011 with higher numbers of MURs conducted in pharmacies that dispensed more prescription items. The p-value in this instance relates to confidence in the result and not how strongly the two variables are associated (Pallant, 2016).

8.5.3 Relationships between independent variables and PD-MURs conducted

Respondents were asked to estimate what percentage of MURs they conducted were PD-MURs; respondents completed their answers by sliding a marker along a scale to give an exact figure, hence this was treated as numerical data.

8.5.3.1 Proportion of MURs that are PD-MURs by pharmacy type

A Kruskal-Wallis Test revealed a statistically significant difference in the proportion of MURs that were PD-MURs conducted across different types of pharmacy:

Table 8-11 Estimated number of MURs that were PD-MURs conducted last month by pharmacy type (n=226)

Pharmacy type	Number of responses	Estimated percentage of MURs that were PD-MURs conducted last month (Median)
Independent (<5 pharmacies)	41	4%
Small multiple (6-10 pharmacies)	15	5%
Medium multiple (11-50 pharmacies)	6	0%
Large multiple (>50 pharmacies)	148	0%
Supermarket	16	0%

χ^2 (4, n=226) =17.875, p=0.001

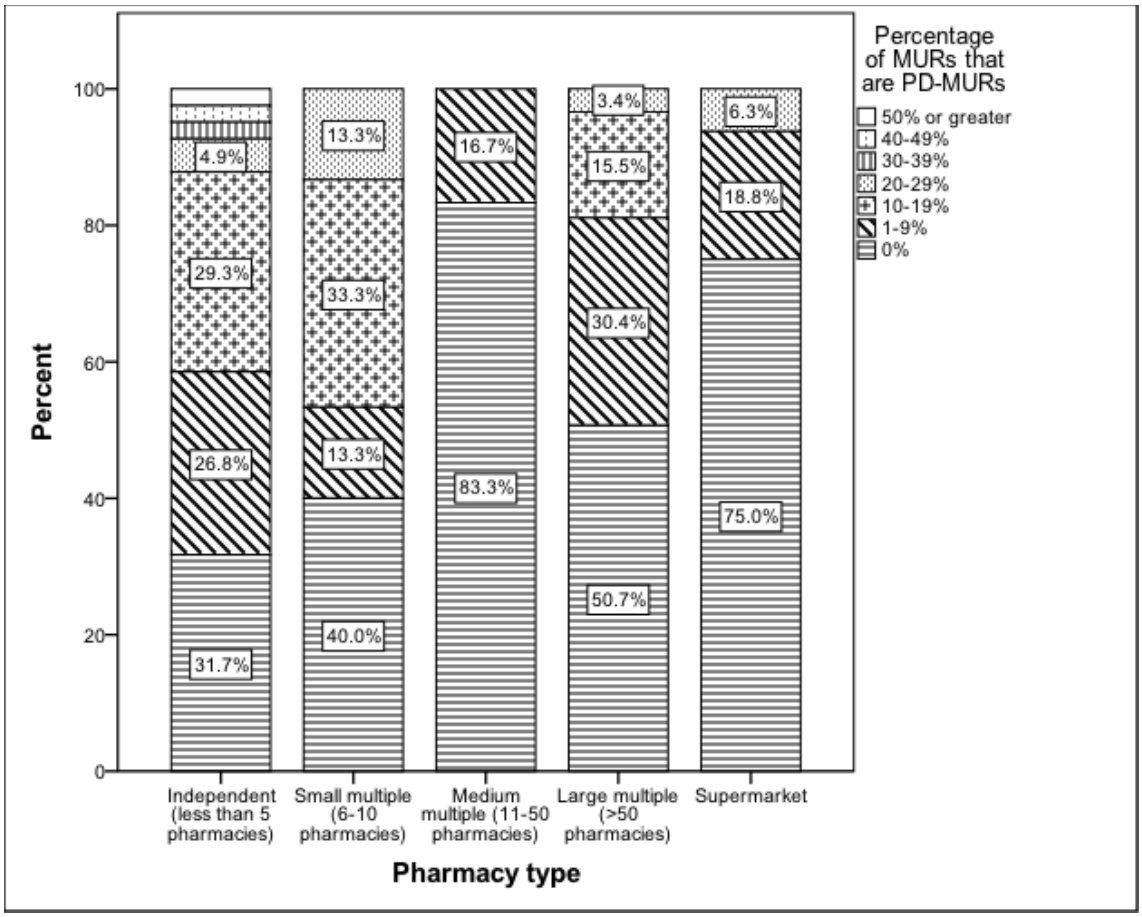


Figure 8-17 Estimated number of MURs that were PD-MURs conducted last month by pharmacy type (n=226)

A subgroup analysis using Mann-Whitney U tests revealed that there was a significant difference between the number of PD-MURs conducted by pharmacists working in independents (median 4%, n=41) compared to large multiples (0%, n=148), U=2182.000, z=-2.904, p=0.004, r=0.2. There was also a statistically significant difference in the percentage of PD-MURs conducted by pharmacists working in independents (median 4%, n=41) compared to supermarkets (median 0%, n=16), U=165.500, z=-3.018, p=0.003, r=0.4. This shows that independent pharmacies conduct more PD-MURs than large multiples and supermarkets.

8.5.3.2 Breakdown of PD-MURs conducted by pharmacists in large multiples comparing urban and rural areas

As for the previous section, a subgroup analysis was conducted to investigate whether there was any difference in the percentage of PD-MURs conducted dependent on the urban or rural location of the large multiples. A Mann-Whitney U test showed that there was no statistically significant difference between urban (median 1%, n=109) and rural areas (median 0%, n=19) in the percentage of PD-MURs conducted, U=949.500, z=-0.615, p=0.538, r=0.05. This intimates that although pharmacists working in large multiples in rural areas conduct more MURs, they are for patients within other target groups rather than for patients who have recently been discharged from hospital.

8.5.4 Relationships between independent variables and appropriate HCP to conduct post-discharge medication reviews

8.5.4.1 Most appropriate health care professional to conduct MURs by location of pharmacy

A chi-squared test for independence indicated a statistically significant association between the location of the pharmacy and which healthcare professional respondents thought was most appropriate to conduct a PD-MUR, χ^2 (4, n=226) =14.136, p=0.007, Cramer's V=0.250.

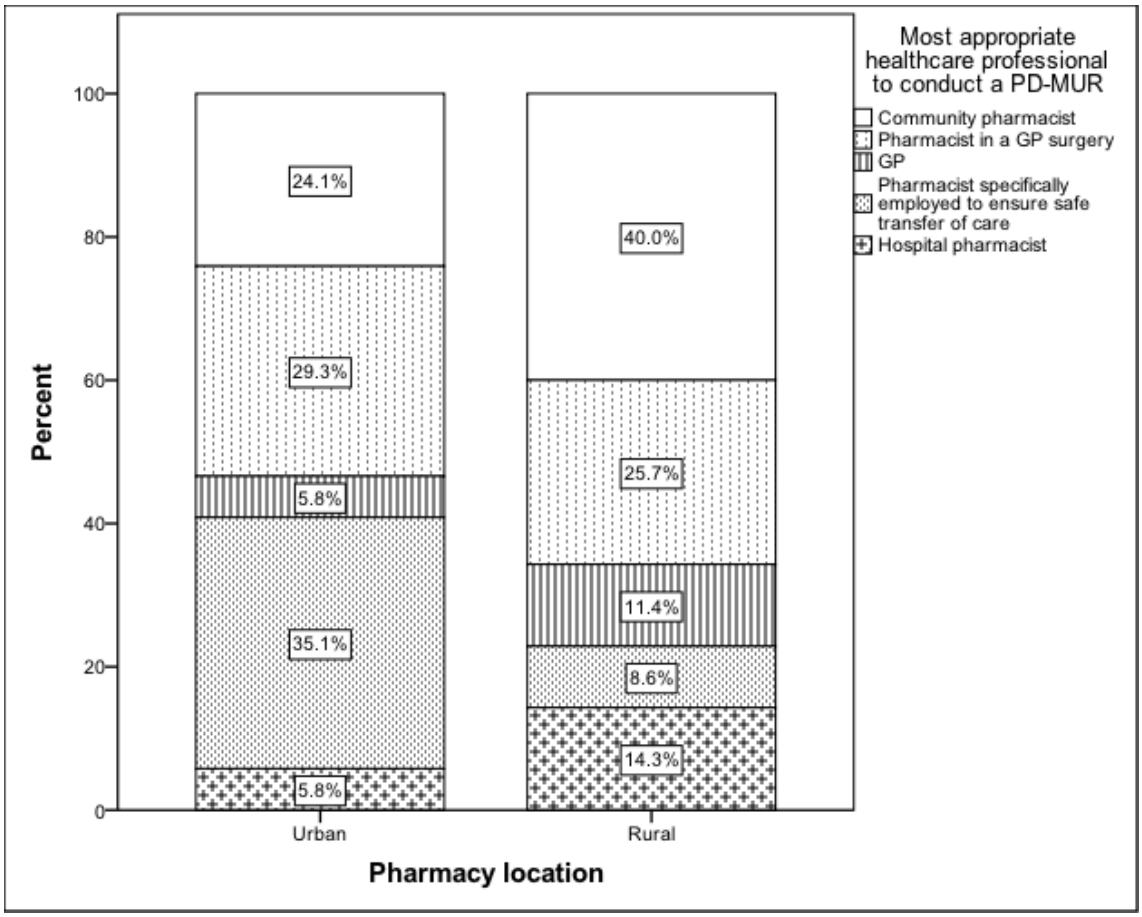


Figure 8-18 Most appropriate healthcare professional to conduct a post-discharge medication review by pharmacy location (n=226)

This showed that community pharmacists working in urban areas were more likely to suggest a pharmacist specifically employed to facilitate transfer of care or a pharmacist working in a GP surgery as the most appropriate HCP to conduct a post-discharge medication review. This was in contrast to community pharmacists working in rural areas who thought they were the most appropriate HCP to fulfil this role.

The next section will report the findings of the factor analysis.

8.6 Factor Analysis

8.6.1 Introduction to the technique

Factor analysis is a data reduction technique that can be used to condense the large amounts of data produced by a questionnaire survey. It interrogates the data to explore underlying correlations and distils them into a smaller number of 'factors' (also known as 'components' or 'dimensions'). Each factor contains items which are grouped in a consistent and coherent manner. The factor analysis technique describes how the items group together into these factors, to give a more 'manageable' set of variables which can be used in further analyses (Bowling, 2009, p. 165; Hair *et al.*, 2010, p. 148; Pallant, 2016).

The term factor analysis covers several different but related techniques that use various measures of variance. The technique that was used for this dataset was principal component analysis, which considers total variance; that is, the sum of common, unique and error variance. This approach is preferred when data reduction is the main aim (Bowling, 2009, p. 165; Hair *et al.*, 2010, p. 148). This technique was used to analyse the data collected from the Likert scale responses to the attitudinal statements in the community pharmacist questionnaire.

8.6.2 Suitability of sample for Factor Analysis

The first stage was to ensure that the data were suitable for the factor analysis technique and this was assessed by using the following:

- Sample size.
- Correlations between statements.
- Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO).
- Bartlett's test of sphericity.

8.6.2.1 Sample size

The minimum number of cases for factor analysis has been suggested as 300 (Bowling, 2009, p. 165; Pallant, 2016, p. 184). This sample contained between 371 and 414 responses for each attitudinal statement, so was of sufficient size for this technique.

8.6.2.2 Correlations between the statements

The correlation matrix showed the intercorrelations between the responses to each of the Likert question statements. There should be sufficient correlations with a value >0.3 for factor analysis with a sample of >350 (Hair *et al.*, 2010, p. 117). The correlation matrix was inspected for statements with correlations >0.3 and a sufficient number were found.

The correlation matrix was also inspected for statements that did not correlate with any of the others and four statements fell into this category. They were:

- **Q6**. Two-way communication is an important part of a good relationship with GPs.
- **Q6**. The majority of patients are aware of the MUR advanced services.
- **Q7**. GPs know where to find medicines-related information to make safe prescribing decisions.
- **Q9**. Patients should have to make an appointment with their community pharmacist for a MUR.

These statements were excluded from the factor analysis on this basis.

8.6.2.3 KMO and Bartlett's test of sphericity

The value of the KMO should be >0.6 and Bartlett's test of sphericity should be statistically significant i.e. $p<0.05$ (Bowling, 2009, p. 166; Pallant, 2016, p. 193). Using these data, the KMO was 0.887 and Bartlett's test of sphericity was <0.001, meaning the data were suitable for factor analysis.

8.6.3 Extracting the factors

The next phase of the analyses involved interrogating the data to decide how many factors best described the dataset. A number of tests were performed to assist in this decision. Only the 27 statements that correlated with one another were included is this part of the analysis.

8.6.3.1 Kaiser's Criterion

This is also known as the eigenvalue rule (Pallant, 2016, p. 185). The eigenvalue of a factor represents the amount of the total variance explained by that factor (Pallant, 2016, p. 185), also described as a measure of a factor's power to explain variation between subjects (Bowling, 2009, p. 165). Factors with an eigenvalue greater than 1.0 support construct validity of the scale and are therefore retained. In this sample seven factors had an eigenvalue >1. These seven factors explained 60.167% of the variance. This method tends to retain a greater

number of factors and should therefore be used in conjunction with the additional techniques described below (Pallant, 2016, p. 185).

Table 8-12 Components extracted with eigenvalues greater than 1 and percentages of variance

Component number	Eigenvalue	% of variance	Cumulative %
1	7.462	27.503	27.503
2	2.421	8.966	36.469
3	1.963	7.271	43.740
4	1.216	4.502	48.243
5	1.128	4.177	52.420
6	1.078	3.994	56.414
7	1.013	3.754	60.167

8.6.3.2 Scree test

The scree plot displays the eigenvalues and factors graphically and helped to determine how many factors should be retained. The shape of the curve changes and the point at which this occurs can help establish which factors contribute most to the variance of the dataset (Pallant, 2016, p. 185).

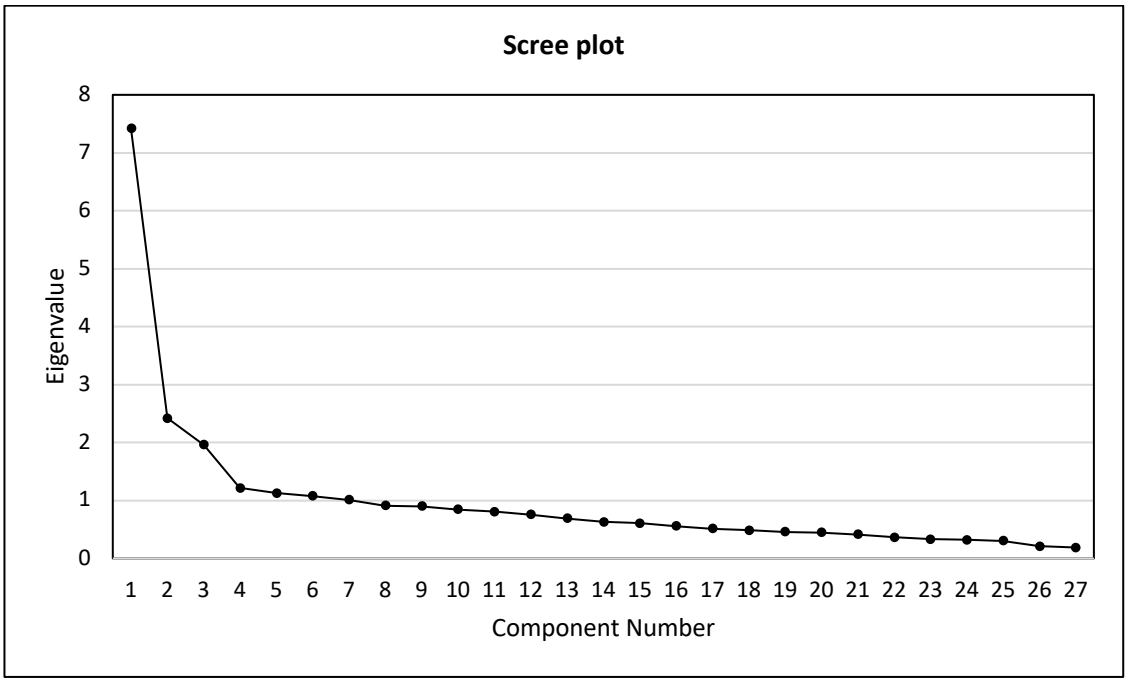


Figure 8-19 Scree plot of eigenvalues for factors

The scree plot shows that components 1 to 3 produce a line with a different gradient to that for components 4 to 27. Using this technique would result in the retention of three factors.

8.6.3.3 Parallel Analysis

Parallel analysis can also be used to work out which factors to retain. Monte Carlo PCA (Pallant, 2016, p. 194), a program for parallel analysis, was used to generate 415 sets of random data with corresponding eigenvalues. Only eigenvalues generated from the actual dataset that were greater than those generated from the parallel analysis were retained (Pallant, 2016, p. 185).

Table 8-13 Comparison of actual and randomly-generated eigenvalues

Component number	Actual eigenvalue from current PCA	Criterion value from parallel analysis	Decision
1	7.426	1.4987	Accept
2	2.421	1.4308	Accept
3	1.963	1.3751	Accept
4	1.216	1.3248	Reject
5	1.128	1.2835	Reject
6	1.078	1.2429	Reject
7	1.013	1.2025	Reject

This technique indicated that the first three components should be retained.

The component matrix showed that most items load on to factor 1 and fewer items load on to the other factors. This makes interpretation of the results more difficult. Factor rotation is used to derive a more meaningful solution to the analysis.

8.6.4 Rotating the factors

8.6.4.1 Rationale for rotating the factors

Factor rotation is the process of turning the reference axes of the factors about their origin to an alternative position with the aim of achieving a simpler structure and a more meaningful solution (Pett, Lackey and Sullivan, 2003, p. 132; Hair *et al.*, 2010, p. 149). Rotations can be orthogonal or oblique; both aim to simplify the results and enhance their interpretability (Bowling, 2009, p. 165; Hair *et al.*, 2010, p. 149).

Unrotated factor solutions extract factors in the order of their extracted variance; this results in most statements loading on to one factor and producing most of the variance. The main objective of rotating the factors is to redistribute the variance so that it is spread out to other factors to achieve a simpler, more meaningful result (Hair *et al.*, 2010, p. 113)

Orthogonal rotations are the simplest as the axes are kept at a 90° angle (Hair *et al.*, 2010, p. 113) and it is assumed that the factors are independent of one another (Pett, Lackey and Sullivan, 2003, p. 134). They can be used to choose the factor solution that minimises overlap of factors and aid in interpretability (Bowling, 2009, p. 165). Oblique rotations are when the axes are rotated but the angle is not kept at 90° (Hair *et al.*, 2010, p. 113); this assumes that the factors are correlated in some way (Pett, Lackey and Sullivan, 2003, p. 134).

Using SPSS, various different rotations, both orthogonal (Varimax rotation) and oblique (Direct Oblimin rotation) were applied to the dataset and different numbers of factors were extracted until a suitable solution was found. The solution that gave the best results involved the extraction of three factors, rotated in an oblique manner using Direct Oblimin rotation with all coefficients <0.4 supressed.

The pattern matrix (Table 8-14), structure matrix (Table 8-15) and component correlation matrix (Table 8-16) that summarise the results of the factor analysis are shown below. The difference between the pattern and structure matrix is as follows:

> "The pattern matrix holds the loadings. Each row of the pattern matrix is essentially a regression equation where the standardized observed variable is expressed as a function of the factors. The loadings are the regression coefficients. The structure matrix holds the correlations between the variables and the factors."
>
> (IBM Support, 2016)

Table 8-14 Pattern matrix from Factor Analysis

Statements	**Component**		
	1	**2**	**3**
I believe that MURs help patients to get the most benefit from their medicines.	.824		
MURs are NOT a waste of time	.773		
Community pharmacists are able to make valuable contributions to patient care through the MUR service.	.771		
I find conducting MURs a satisfying part of my job.	.739		
MURs are NOT a waste of money	.737		
GPs should refer patients to community pharmacists for MURs.	.667		
Community pharmacists have the right skills to perform high-quality MURs.	.667		
There is the right skill-mix in the pharmacy to enable MURs to be conducted.	.597		
Community pharmacists can provide patients with better information about medicine safety and use than GPs.	.533		
Community pharmacists should automatically be sent a copy of the patient's discharge summary.	.532		
Hospital pharmacists should promote the PD-MUR service to patients when they are in hospital.	.507	.410	
GPs should NOT conduct more thorough reviews of patients' medicines, so MURs ARE required	.500		
Community pharmacists are able to build long-lasting trusted relationships with their patients.	.494		
GPs should provide feedback to community pharmacists when recommendations are made as the result of a MUR.	.490		
Community pharmacists routinely identify major issues relating to patient safety.	.483		
Community pharmacists and hospital pharmacists should have a two-way process for communication.	.445		
Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.	.420		.405
MURs are not conducted on patients with the most complex medicines needs			
Community pharmacists require access to the patient's GP medical record to conduct a PD-MUR.		.732	
Community pharmacists cannot conduct MURs properly unless they have access to the patient's GP medical record.		.608	

Community pharmacists would be able to provide a better service to patients recently discharged from hospital if they could conduct PD-MURs in the patient's home.		.509	
PD-MURs are more complex and time consuming than other types of MURs.		.481	
GPs have a high regard for the contribution that community pharmacists make to the care of their patients.			.739
GPs DO NOT view community pharmacists as just the suppliers of their patients' medicines			.718
Patients DO NOT see community pharmacists as just the suppliers of their medicines			.537
GPs in my local area ask for my advice about medicines-related issues for their patients.			.532
Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.			

Table 8-15 Structure matrix from Factor Analysis

Statements	Component		
	1	2	3
I believe that MURs help patients to get the most benefit from their medicines.	.827		
Community pharmacists are able to make valuable contributions to patient care through the MUR service.	.802		
MURs are NOT a waste of time	.797		
I find conducting MURs a satisfying part of my job.	.754		
MURs are NOT a waste of money	.750		
Community pharmacists have the right skills to perform high-quality MURs.	.690		
GPs should refer patients to community pharmacists for MURs.	.676		
There is the right skill-mix in the pharmacy to enable MURs to be conducted.	.545		
Community pharmacists can provide patients with better information about medicine safety and use than GPs.	.542		
Community pharmacists routinely identify major issues relating to patient safety.	.522		
Community pharmacists are able to build long-lasting trusted relationships with their patients.	.515		
GPs should NOT conduct more thorough reviews of patients' medicines, so MURs ARE required	.505		
Community pharmacists should automatically be sent a copy of the patient's discharge summary.	.498		
GPs should provide feedback to community pharmacists when recommendations are made as the result of a MUR.	.448		
MURs are not conducted on patients with the most complex medicines needs			
Community pharmacists require access to the patient's GP medical record to conduct a PD-MUR.		.728	
Community pharmacists cannot conduct MURs properly unless they have access to the patient's GP medical record.		.592	
Community pharmacists would be able to provide a better service to patients recently discharged from hospital if they could conduct PD-MURs in the patient's home.		.521	
Hospital pharmacists should promote the PD-MUR service to patients when they are in hospital.	.545	.473	

PD-MURs are more complex and time consuming than other types of MURs.		.458	
Community pharmacists and hospital pharmacists should have a two-way process for communication.	.458	.416	
GPs DO NOT view community pharmacists as just the suppliers of their patients' medicines			.731
GPs have a high regard for the contribution that community pharmacists make to the care of their patients.			.722
Patients DO NOT see community pharmacists as just the suppliers of their medicines			.573
GPs in my local area ask for my advice about medicines-related issues for their patients.			.551
Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.	.524		.493
Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.			.406
Cronbach's Alpha	0.890	0.621	0.715

Table 8-16 Component correlation matrix from Factor Analysis

Component	1	2	3
1	1.000	.120	.221
2	.120	1.000	-.043
3	.221	-0.043	1.000

8.6.5 Reliability

Each factor was subjected to analysis of Cronbach's coefficient alpha. This measure of reliability represents the proportion of total variance in a given scale that can be attributed to a common source (Pett, Lackey and Sullivan, 2003, p. 185). Hair *et al.*, (2010, p. 125) states that Cronbach's alpha assesses the consistency of the entire scale and that individual items are all measuring the same construct. The generally agreed lower limit for Cronbach's alpha is 0.7, although 0.6 is acceptable for exploratory research (Hair *et al.*, 2010, p. 125).

The structure matrix presented above shows that Cronbach's alpha is >0.7 for factors one and three and >0.6 for factor two.

8.6.6 Explanation of the factors

Once the structure matrix was finalised a descriptor could be assigned to each of the factors. In this study, the factors can be described as follows:

Factor 1	Factor 2	Factor 3
Expertise of the community pharmacist	**Key characteristics/ facilitators of PD-MURs**	**GPs' and patients' views of pharmacists**
The expertise of the community pharmacist, the skills they have, the relationships they can build and what they can contribute to patient care.	Issues that affect community pharmacists conducting MURs/PD-MURs more effectively, such as having access to more information.	Community pharmacists' thoughts about how others view them and the contribution they can make to patient care.

8.6.7 Further analyses

Once the statements for each factor had been deduced, the participants' responses to each of the statements for a particular factor were totalled together to give a composite score for each factor. This composite score was used in further statistical tests to determine whether any of the independent variables were associated with the attitudes to these factors.

8.6.7.1 Statistical analyses using composite score for each factor

The only factors that were statistically significantly associated with the independent variables were as follows:

- Year of qualification was significantly associated with attitudes to factor 3
- Type of pharmacy worked in was significantly associated with attitudes to factor 1.

Year of qualification

To come to these conclusions the composite score of each pharmacist for each factor was analysed in a Mann-Whitney U test, investigating whether there was any association with the pharmacist's year of qualification. As explained previously, the year of qualification was split into a dichotomous variable of whether the pharmacist had qualified with a BPharm or MPharm degree (changed in 2001) or whether they had qualified before or after the introduction of the new community pharmacy contract (introduced in April 2005). There was a significant difference in responses to statements associated with factor 3 based on the year of qualification. A lower composite score indicated that pharmacists were more in agreement with the statements that made up factor 3 and a higher composite score indicated pharmacists disagreed with the statements that made up factor 3. Pharmacists who qualified with a BPharm degree (median = 15.0, n=135) were more in agreement with the statements that were included in factor 3 than those who qualified with an MPharm degree (median = 17.0, n=173), $U=8867$, $z=-3.632$, $p<0.0001$, $r=0.20$.

This was also true for pharmacists who qualified before or after the introduction of the new community pharmacy contract in April 2005; pharmacists who qualified before the new contract were more in agreement with statements that were included in factor 3 (median = 15.0, n=155), compared to those pharmacists who qualified after the introduction of the new contract (median = 17.0, n=153), $U=9202$, $z= -3.406$, $p=0.001$, $r=0.19$.

This means that pharmacists who qualified longer ago felt that GPs and patients were more willing to engage with them and ask for their advice than pharmacists who qualified more recently.

Type of pharmacy

The type of pharmacy worked in also showed a nearly statistically significant association with pharmacists' attitudes to factor 1. This was analysed using a Kruskal-Wallis test.

Table 8-17 Analysis of community pharmacists' attitudes and experiences of factor 1 and pharmacy type

Group	n	Median score for factor 1
Independent (<5 pharmacies)	43	25
Small multiple (6 – 10 pharmacies)	15	23
Medium multiple (11 – 50 pharmacies)	7	28
Large multiple (>50 pharmacies)	173	27
Supermarket	17	31
Total	255	26

$\chi 2$ (4, n=255) = 12.952, p=0.012

A follow-up analysis was conducted using Mann-Whitney U tests to look for which types of pharmacy the respondent worked in, compared to their score for attitudes associated with factor 1. There was a statistically significant difference when small multiples (median 23, n=15) were compared with supermarkets (median 31, n=17), U=40.500, z=-3.291, p=0.001, r=0.6, meaning that pharmacists who worked in small multiples had lower scores for factor 1 compared to those working in supermarkets. This means pharmacists working in small multiples were more in agreement with the statements included in this factor which addressed the area of the expertise of the community pharmacist. They felt that community pharmacists were able to provide expertise to their patients and give them more 'added value' compared to those pharmacists who worked in supermarkets.

This concludes the presentation of the findings from the factor analysis.

8.7 Responses to open questions in the survey

8.7.1 Improvements to patient care after hospital discharge

Respondents were asked whether they thought there was anything else that should be implemented to improve the care of patients recently discharged from hospital. Pharmacists were given a free text box to respond to this question and 131 responses were received.

A wide variety of topics were discussed. As the comments were included in a quantitative data collection tool, they were not suitable for qualitative analysis methods. The comments were reviewed and could be broadly categorised into the following areas: communication, access to information, the MUR service and the number of days' supply of medication. A synopsis of the comments is presented here.

8.7.1.1 Communication

The issue that was raised by most respondents to this question was around communication between the different health care professionals, particularly GPs, community pharmacists and hospital pharmacists. Community pharmacists felt that improved communication was necessary at the interface between secondary and primary care at the time of hospital discharge, and that this should occur more quickly.

> "Improved communication is key. I rarely receive the information I need to be able to provide adequate patient care."
>
> Pharmacist #359

8.7.1.2 Access to information

One pharmacist gave an example of a GP surgery that were not prepared to give them a patient's discharge information.

> "…some GP surgeries refuse to share this information on the basis of 'patient confidentiality', and this can make our job difficult when we are trying to help the patient."
>
> Pharmacist #494

Community pharmacists also raised the issue of what information they required when one of their patients was discharged from hospital. They reported that often they did not receive any information and that could have an impact on patient safety.

> '…safety incidents which DO happen when patients end up being prescribed and dispensed the drugs they were taking before admission, instead, or sometimes at the same time, (rather) than those newly prescribed on discharge."
>
> Pharmacist #358

A range of responses was received about what information was required, from just being informed someone was in hospital to wanting a full discharge summary including new and discontinued medicines at the time of discharge. Some pharmacists also highlighted that there was a need for information to be made available on a platform that they could access, such as NHS mail or the SCR.

> "Information, especially changes in medication should automatically upload to SCR."
>
> Pharmacist #387

8.7.1.3 The MUR service

As the focus of the questionnaire was MURs, there were a number of comments that highlighted improvements to the system; several pharmacists felt that patients should be informed of the PD-MUR service whilst they were in hospital and encouraged to inform their community pharmacist of their hospital admission, including taking the discharge summary to show them. Other pharmacists thought PD-MURs should be compulsory or that domiciliary PD-MURs should be routinely offered to patients after hospital discharge.

> "they should be signposted to their community pharmacist as a routine and where possible book a domiciliary visit from the pharmacist."
>
> Pharmacist #332

One pharmacist felt that a full clinical review by an appropriate pharmacist would be the best option:

> "MUR isn't really sufficient as it concentrates on medicine use. Need a clinical review which would be best done by a pharmacist with access to discharge summary, GP notes and community pharmacy PMR (to assist with compliance and ordering issues). It doesn't matter where the pharmacist is employed, but they should be empowered and given the time and training and access to the required information required to do a good job."
>
> Pharmacist #95

8.7.1.4 Number of days' supply of medication on discharge

Another topic that was mentioned by several pharmacists was around the number of days' medication supplied when a patient left hospital.

> "A nationally agreed number of day/weeks of medication on discharge (it is too variable at present)."
>
> Pharmacist #274

This really is a surrogate marker for the timeliness of the community pharmacist receiving the information they require. If the community pharmacist had guaranteed access to the discharge information more quickly the number of days' supply of medication on discharge would not be so important. Several respondents reported that patients came to the pharmacy because they had run out of medicines after a hospital discharge and this caused obvious problems.

The free text comments provided very useful insights into some of the issues that community pharmacists face around hospital discharge and where there are risks in the current system.

8.7.2 Additional comments made after completing the questionnaire

Respondents were also given a free text box to makes any other comments about the subject of the questionnaire and 90 comments were received. The comments made were about the MUR service more generally and some of the issues that community pharmacists face when they are offering this service to their patients. As for the other free text comments, the comments were reviewed and could be broadly categorised into the following areas: positive aspects of MURs; time pressures and skill mix; employer pressures and the professional integrity of the pharmacist; patient selection; and remuneration.

8.7.2.1 Positive aspects of MURs

Many pharmacists used this opportunity to highlight that MURs were a worthwhile service both for the patient and themselves. They felt that the service should be promoted more to patients to improve medicines optimisation and adherence. Closer working with GPs would also help to improve the service.

> "I believe MURs are a key tool for patients, and pharmacists. However, more can be done to improve the effectiveness, including GPs using the information and not discarding it."
>
> Pharmacist #359

8.7.2.2 Times pressures and skill mix

Many pharmacists raised the issue that MURs were time consuming and often conducting a MUR caused other pressures in the workload of the pharmacy. This was due to insufficient staff and the pharmacist having competing tasks to complete apart from the MUR. This could result in interruptions to the pharmacist's work and even making the pharmacy less safe. Pharmacists reported that patients were told a MUR would take two minutes or that MURs were being conducted in 60 seconds when medicines were being handed out to the patient. Several pharmacists felt that to conduct a proper MUR, sufficient time was necessary to ensure that the patient gained most benefit from the process.

> "…to do a proper informative MUR takes longer than the +/- 15 minutes allocated to it. Staffing shortages and work pressures mean that often MURs are being done too hastily to be of any benefit to anybody, especially the patient, who may be confused and needing time to understand what you are discussing with them."
>
> Pharmacist #483

One pharmacist thought that for a recently discharged patient with additional needs, up to 30 minutes would be required for a successful PD-MUR.

8.7.2.3 Employer pressures and the professional integrity of the pharmacist

A large number of pharmacists commented that they came under pressure from their employer to conduct MURs. This was often because they had been given a target of the number of MURs that should be conducted each day. All the pharmacists who commented viewed this negatively and some stated that they thought the pharmacists must be able to use their own judgement about which patients should receive a MUR.

> "…a MUR must be carried out when a pharmacist finds it suitable not when the company is placing immense pressure."
>
> Pharmacist #365

> "MURs are valuable when the pharmacist is able to use their professional judgement regarding who receives one…pharmacists should be beyond reproach over the delivery of clinical services, and they should be supported and fully protected to ensure their professional integrity is not compromised."
>
> Pharmacist #301

A number of pharmacists also thought that educating patients about their medicines was their role anyway and this was not dependent on the existence of the MUR service. They also stated that they would intervene for the benefit of their patients, rather than for the financial reward a MUR would bring.

8.7.2.4 Patient selection

Due to the time constraints and company pressures many pharmacists reported that 'easy' patients were selected for MURs.

> "…this often leads to MURs being conducted on those patients that are seen as 'easy' MURs to reach targets as opposed to dealing with post discharge patients or those MURs that would be more complex and thus take longer."
>
> Pharmacist #391

> "the number one flaw with the system of MURs is that those patients on multiple polypharmacy (20+ meds) are NOT targeted for MURs whereas those patients on a simple preventer/reliever inhaler regime are targeted. Classic cherry picking."
>
> Pharmacist #15

Pharmacists suggested that these 'easy' MURs were pointless, unnecessary, and of no benefit to the patient.

8.7.2.5 Remuneration for MURs

Pharmacists reported difficulties resolving the remuneration associated with MURs. Some felt that the issues raised as part of a MUR were part of their normal role and so should not attract an additional fee. The fact that all MURs received the same fee gave the focus on the number of MURs completed rather than the quality of the service provided. This therefore did not represent good value for money for the NHS but rather was a 'money making' scheme for the pharmacy. Many pharmacists used the terms 'box ticking' or 'paper exercise' when describing MURs.

> "…although MURs can be beneficial, I feel that the majority are done as a box ticking and target hitting exercise, therefore they are a waste of money for the NHS since they do not achieve what the aim of the MUR was."
>
> Pharmacist #98

Several pharmacists felt that the remuneration for MURs and the community pharmacy contract needed reviewing to incentivise conducting MURs for the patients who would gain most benefit.

The free text comments were insightful, and with the quantitative findings, helped to inform the recommendations. This concludes the summary of the free text comments from the survey.

8.8 Discussion of results of community pharmacist survey

8.8.1 The use of social media as a recruitment tool

The recruitment of participants to studies using social media is a relatively new phenomena and there is not much in the published literature about the optimal methods; the ethical issues have already been discussed in section 8.2.3. Previous studies have shown that social media can be useful in recruiting participants to clinical trials. A study recruited pregnant women to investigate the pharmacokinetics of folic acid levels in pregnancy. They compared the recruitment of participants traditionally, with those recruited via websites and social media (Facebook and Twitter). The authors found that when they used social media they gained significantly more participants each month to their study than when they used traditional methods (Shere, Zhao and Koren, 2014). Another study of a behavioural support programme for smoking cessation compared the recruitment of participants using traditional methods and online methods (Facebook) and found that the only difference in respondents was their age; with more younger people responding to the online recruitment (Frandsen, Walters and Ferguson, 2014).

The use of Twitter to recruit participants to complete surveys in health research has not been extensively studied. A published paper reported the use of Twitter to recruit older mothers to complete an online questionnaire about antenatal care. The authors found that Twitter was a cost-effective method of recruiting participants and provided a way to reach potentially hard-to-reach groups. It gave the participants anonymity and an accessible way of accessing the online questionnaire. The only limitation mentioned by the authors was the risk of selection bias (O'Connor *et al.*, 2013). The current study appeared to be reasonably successful in recruiting participants using social media and online professional networks but, in this case, did not compare these methods to traditional methods.

The National Institute for Health Research (NIHR) has published guidance on the use of social media to actively involve people in research (Involve, 2014). They have suggested the benefits of doing so include: increased diversity of participants, convenience for the participant, allowing networking between the researchers and participants and between participants, anonymity so participants are free to express their opinions, increased accessibility and generally free to use. The drawbacks include: selection only of participants with internet access, the public nature, transient characteristics of the posts, the need to be skilled at using the site, time to engage with potential participants and organisational rules on engagement with social media and ethical considerations (Involve, 2014).

8.8.2 Age of pharmacists

When community pharmacists were asked to estimate the number of MURs they conducted during the previous month, this showed a relationship to the age of the pharmacist. Younger pharmacists, those with MPharm degrees or who qualified after the introduction of the new contract, reported that they conducted more MURs than older pharmacists. When comparing younger and older pharmacists; younger pharmacists also felt that GPs and patients were less willing to engage with them as demonstrated by their responses to the attitudinal statements incorporated into factor 3.

Conversely, older pharmacists would have experience of supporting and educating their patients and liaising with GPs to resolve medication problems without the formality or remuneration of the MUR system. In the current study older pharmacists felt GPs and patients were more willing to engage with them. It could be postulated that older pharmacists may not see the benefits of MURs in the same way as younger pharmacists and consequently are not as eager to conduct as many of them; they may see some of the activities that have been formalised through the MUR system as just part of their normal job, rather than seeking to formalise the consultation as a MUR. An analysis of age compared with type of pharmacy worked in was conducted using a Chi-squared test. This found a non-significant trend towards pharmacists who qualified before the introduction of the new contract being more likely to work in independent pharmacies than those who qualified later [$\chi 2$ (4, n=230) = 9.532, p=0.049], which may also result in closer working relationships with GPs and patients.

Younger pharmacists have no experience of working in the community and building relationships with GPs in the pre-MUR era. Younger pharmacists have always had the potential burden of MUR pressures on them and may find it difficult to exert their professional judgement when choosing suitable patients for MURs or deciding how many MURs they should conduct. One published paper stated that GPs were reported to place no value on MUR forms (McDonald *et al.*, 2010) and this attitude may have been felt by younger pharmacists.

No published papers were found that referred to the age of the pharmacist having an effect on the number of MURs conducted or how GPs and patients viewed them. Although a qualitative study of pharmacists working in GP practices in England did find that pharmacists who were qualified more recently and those with less experience were more minded to undertake additional training to equip them for extended roles and to further their careers, than pharmacists who had been qualified for longer (Butterworth *et al.*, 2017).

Latif, Pollock and Boardman (2013) found that pharmacists were more likely to conduct MURs for patients who had good relationships with pharmacy staff (Latif, Pollock and Boardman, 2013). It could be postulated that younger pharmacists, who tended to have more negative opinions about how patients and GPs viewed them, felt that they would get better results conducting MURs on patients they knew well and would get a more favourable response from GPs to their recommendations, if they were familiar with them. This may also encourage younger pharmacists to conduct simpler and therefore quicker MURs. As with the pharmacists who responded in this questionnaire survey, a review of the literature around medication reviews found that access to information, good working relationships with other HCPs, especially GPs, and pharmacists working as part of the primary care team have been shown to enhance the quality of medication reviews (Blenkinsopp, Bond and Raynor, 2012).

Perhaps younger pharmacists who had always worked within the MUR system felt that the lack of feedback from GPs about the outcomes of MURs was a reflection of how GPs perceived them and made the pharmacists reluctant to engage with them. Community pharmacists have previously reported that it is difficult to know whether their interventions have been actioned as they do not receive feedback from GPs (Wilcock and Harding, 2008).

One possible confounding factor related to the age of the pharmacists could be the propensity for part-time working that may occur for pharmacists who qualified before 2002. These

pharmacists may be more likely to work part-time due to child care commitments and this would account for fewer MURs conducted. The respondents were not asked about how many hours they worked per week to allow any further analysis of this aspect.

8.8.3 Type of pharmacy

The results of the questionnaire survey highlighted that even though pharmacists working in larger multiples conduct more MURs, these are less likely to be PD-MURs. This finding was also supported by the free-text comments of several community pharmacists who reported external, often company pressures, to conduct MURs in large multiples. This is not a new issue as many previously published papers have also found pharmacists being put under pressure from the companies to conduct MURs (Bradley *et al.*, 2008; Harding and Wilcock, 2010; McDonald *et al.*, 2010; Youssef, Hussain and Upton, 2010).

The consequence of this pressure is that pharmacists choose patients on simpler medication regimes for MURs and this was also confirmed by some pharmacists' comments in the free-text boxes from the questionnaire. This phenomenon is also described in a published paper, where pharmacists reported conducting MURs for patients on simpler regimes to ensure MUR targets were achieved (Latif, Pollock and Boardman, 2013). PD-MURs may take longer to complete (Kennelty *et al.*, 2015) and tend to be more complex (Rutter, Ramsbottom and Fitzpatrick, 2017). This additional work would not encourage pharmacists working under pressure to conduct PD-MURs rather than standard MURs as there is no additional benefit for the pharmacist in terms of workload, fulfilling targets or remuneration.

The current study also found a statistically significant difference in the attitudes of pharmacists working in small multiples compared to supermarkets, in terms of their expertise. Pharmacists working in small multiples thought that they were more able to offer their expertise and make contributions to patient care. This could be explained by the supermarket environment perhaps being more geographically isolated from patients and GPs, meaning pharmacists are less familiar with these individuals and therefore find it more difficult to pass on their expertise.

8.8.4 Location of pharmacy

There was no statistically significant difference in the number of MURs completed by pharmacists working in urban areas compared to rural areas. In a sub-group analysis,

pharmacists working for large multiples in rural areas conducted significantly more MURs than those working for large multiples in urban areas. The reason for this could be twofold; a pressure to complete MURs coupled with good patient relationships resulting in high levels of MUR recruitment.

Community pharmacists working in urban and rural areas did have different opinions about who should conduct post-discharge medication reviews, with those working in rural areas much more likely to suggest the community pharmacist, compared to those in urban areas who were more likely to suggest a pharmacist specifically employed to ensure the safe transfer of care from secondary to primary care.

The nature of working relationships between community pharmacists and GPs may be different in urban and rural areas. Löffler *et al.* (2017) have suggested that 'urban anonymity' exists in cities, so pharmacists and GPs hardly know one another whereas in rural areas, pharmacists and GPs have long-lasting relationships based on trust and appreciation, leading to enhanced collaboration (Löffler *et al.*, 2017). The importance of the community pharmacist-GP relationship for resolving medication issues has been highlighted by other authors who propose that for high quality medication reviews, a good relationship is important (Blenkinsopp, Bond and Raynor, 2012). Previously, it has been postulated that strong collaborative relationships are the exception rather than the norm (Chen and Almeida Neto, 2007).

Patients who have been recently discharged from hospital may have more complex medicines-related needs. In rural areas, there may also be less access to interface pharmacists compared to urban areas. Community pharmacists working in rural areas, with good patient relationships, believe they are in the best position to provide medicines-related support and advice after a hospital discharge. Perhaps strong and stable pharmacist-patient-GP relationships in rural areas result in greater collaborative working, and a perception that newer interface pharmacy roles are not required as the community pharmacist is already providing optimal care.

8.8.5 Lack of PD-MUR activity

There is an inherent difficulty in identifying patients who have recently been discharged from hospital and are eligible for a PD-MUR. More than half of the pharmacists had not carried out a

PD-MUR in the previous month. The majority of respondents (80%) said they did eventually find out that a patient had recently been in hospital, but there was no consistency in the method of communication. Non-digital methods, such as telephone and fax, were reported by more than two-thirds of pharmacists despite the fact that only 17.8% of pharmacists thought these were the best methods of communication. These methods rely on an individual, from the hospital, taking the time to initiate the communication and this would be dependent on the individuals involved and time constraints. Community pharmacists would like to receive a full discharge summary (preferred level of information stated by nearly two-thirds of respondents) sent to them electronically (seen by less than 10% of respondents currently but wanted by nearly four-fifths of pharmacists).

There is a definite need for patients to be supported in managing their medicines after they have been discharged from hospital. It has recently been estimated that 1.4% of all medication errors occur when a patient is transferring from one care setting to another and of these, 51.6% have the potential to cause moderate harm and 7.3% the potential to cause severe harm (Elliott *et al.*, 2018). One of the major barriers for community pharmacists is in the identification of patients who have recently been in hospital.

Pharmacists working in independents were found to conduct more PD-MURs and felt that they were able to provide more expertise to their patients than those pharmacists working in medium to large multiples or supermarkets. This could be because they know their patients better and there is more continuity with staff in independent pharmacies. It could be postulated that these pharmacists would be more likely to know that one of their regular patients had been discharged from hospital and would be able to offer them a PD-MUR. This then contributed to their opinion that they were able to provide greater expertise to their patients. This means that pharmacists who are able to offer the more time-consuming and greater depth of PD-MURs actually felt that they were able to support their patients better in their medicines taking through their expertise.

There is huge pressure on community pharmacists in the current financial climate and even though they acknowledge they do have the skills and expertise to conduct PD-MURs they thought that practice or interface pharmacists would be better suited to complete the task. This may reflect the inherent difficulties in identifying patients, getting the information required in the form of a discharge summary and having sufficient time to conduct the more

time-consuming PD-MURs. As previously mentioned, there are many practical advantages if a practice pharmacist conducts PD-MURs. The lack of a specific mechanism for remuneration in general practice could be seen as an advantage, as the service is being provided solely for patient benefit without the perception or complication of commercial pressures.

8.9 Strengths and limitations of community pharmacist survey

There are various strengths and limitations to conducting a large-scale survey which are discussed in this section. The strengths of this part of the study are the number of pharmacists who responded and participated in the online survey. The sample of respondents appeared to be representative of community pharmacists as a whole, when compared with the 2013 workforce survey. The use of social media in health research has already been discussed in section 8.8.1. The use of professional networks and social media meant that the publicity and distribution costs of the survey were nil. The other advantages of using this type of sampling were that when influential social media users or professional organisations with high numbers of followers publicised the study, this increased the number of respondents. The study recruited sufficient respondents to permit factor analysis to be used as the analytical technique and allowed some sub-group analysis of pharmacists who had varying demographic characteristics.

There were limitations to this part of the study. Due to the sampling method, it was not possible to calculate a response rate due to the lack of an identifiable denominator. It was also not possible to publicise the study to all eligible community pharmacists. Community pharmacists who were not members or employees of the organisations that publicised the survey, or active users of social media for pharmacy-related purposes would not have known about the survey; likewise, pharmacists who were not online. In an online questionnaire volunteer bias may have occurred, whereby volunteers were in some way different to the population of interest (Sedgwick, 2013).

The use of an online survey tool also meant there was the possibility that non-pharmacists or pharmacists working in other sectors may have completed the survey, respondents could have completed the survey more than once, and there was no way to remind pharmacists about the study. For the community pharmacists who did access the survey, there appeared to be quite a high rate of attrition when completing the questionnaire; 495 respondents started the survey but only 274 completed the full questionnaire; hence missing data was an issue. As with all

self-completed questionnaires, there is limited opportunity for the respondent to ask questions or clarify the questions. All answers were self-reported so for some of the questions such as number of MURs conducted, the answers were based on respondents' recall rather than actual data, thus the results could be affected by recall bias.

When analysing the responses to the questionnaire it became apparent that although respondents estimated the number of MURs conducted in the previous month, they were not asked about how many hours they worked per week. This meant that no accounting was made for part-time working compared to full-time working.

8.10 Future research

Future research should focus on gaining further insights into the recruitment of community pharmacists for health services research using online methods including social media. In the current study, a cohort of nearly 500 community pharmacists were recruited to participate but there is a lack of published evidence about the optimal method of recruitment and whether respondents recruited online are any different to those recruited using traditional methods.

It would also be useful to conduct some further research into the differences in attitudes between pharmacists working in different types of pharmacies to determine the reasons why their practice differs in relation to PD-MURs.

8.11 Summary of survey of community pharmacists chapter

This chapter has outlined community pharmacists' experiences and opinions of the MUR service in England. Some interesting associations have been found between the age of the community pharmacists, type and location of the community pharmacy and variables such as the number of MURs conducted and who is best placed to conduct a PD-MUR.

The findings of the HES data study, the patient and pharmacist interviews, and the pharmacist survey as a whole, will be discussed in the context of the published literature in the next chapter.

9 Discussion

Chapter Overview

This chapter will synthesise the topics that have been raised by the findings in chapters 6, 7 and 8. These previous chapters have discussed the findings of each phase of the study in relation to the published literature. This chapter will highlight the originality of this study and suggest ways that policymakers and future researchers should use the results of this study to change practice and build on the findings to further strengthen the evidence-base for the role of pharmacists in caring for patients who have recently been discharged from hospital.

9.1 Introduction

The first aim of this study was to explore the knowledge and attitudes of patients and community pharmacists around post-discharge medicines support, particularly PD-MURs. The second aim was to determine the implications of the findings on how pharmacists can more effectively use their clinical skills, and tools such as PD-MURs, to help patients manage their medicines better once discharged from hospital, with a view to reducing medicines-related hospital admissions. This chapter will synthesise the findings of the different phases, discuss them in the context of the published literature and make recommendations about the adjustments necessary to improve the present system.

When considering the findings, the HES data phase is not specifically included as this was a preliminary piece of background work rather than a fundamental component of the fieldwork. However, the results of the HES study informed the subsequent phases of the fieldwork as they demonstrated the continued burden of emergency medicines-related admissions between 2008 and 2015. This phase of the study also confirmed that the medicines responsible for medicines-related admissions had not changed over time when compared to previously published studies. These findings helped to determine the optimum locations and types of patients to focus on for the first qualitative phase of the fieldwork which involved interviewing patients about their medicines-related hospital admission.

On completion of the fieldwork, the findings and themes of the various phases of the study were consolidated on to one page. A period of thought and reflection then followed to deduce

the connections between the pertinent points. This process gave rise to three themes that form the structure of the discussion chapter and displayed elements of commonality through all phases of the fieldwork. These overarching and interrelated themes are expertise; relationships; and communication and integration, they are summarised in Figure 9-1.

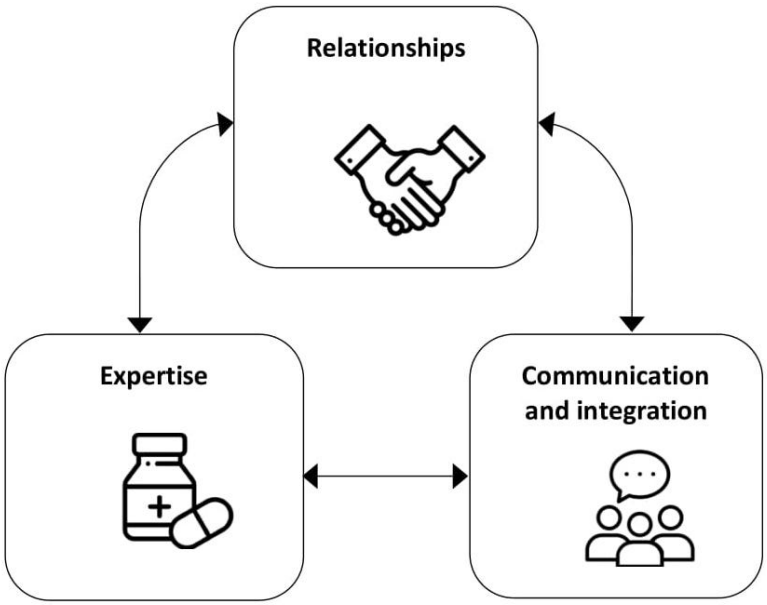


Figure 9-1 Overarching themes

For each of these themes, consideration will be given to how they interlink with one another and how policymakers could use this evidence with the aim of improving patient care and ultimately reducing medicines-related hospital admissions.

The findings of the current study have led to the development of various recommendations that are somewhat interlinked. Due to the interconnected nature of the themes it was necessary to briefly mention some points prior to their full discussion, to help contextualise the recommendations, hence Figure 9-2 is included here as an overview. One of the key recommendations to come from the current study is that PD-MURs should be split into two; an initial post discharge medication review and medicines reconciliation conducted by the practice pharmacist, followed by a 'first dispensing' MUR (FD-MUR) conducted by the community pharmacist. The rationale for this recommendation will be explained in the following sections of this chapter.

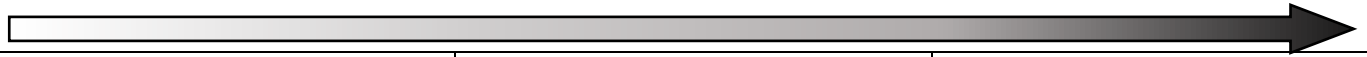
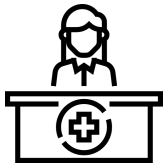
TIME			
LOCATION	**Hospital** 	**GP Surgery** 	**Community Pharmacy** 
PROFESSIONALS INVOLVED	**Hospital Doctor and Hospital Pharmacist** 	**Practice Pharmacist** 	**Community Pharmacist** 
ACTIVITY	• Medicines reconciliation on admission. • Medicines reconciliation on discharge. • Accurate and timely discharge summary.	• Post-discharge medicines reconciliation, review and patient education. Ideally with the patient present. • Update repeat prescription template.	• First-dispensing MUR (FD-MUR) when collecting first prescription after discharge. • Patient education. • Patient support.
INFORMATION FLOW	Free flow of information between hospital, GP surgery and community pharmacy. Eventually, read and write access for all.		

Figure 9-2 Suggested optimal care for patients discharged from secondary care to primary care

9.2 Expertise

This section focusses on the theme of expertise; specifically, the expertise of community pharmacists and how their unique training and knowledge of medicines can enhance the care of patients who have recently been discharged from hospital.

9.2.1 Pharmacists as the experts in medicines

Pharmacists see themselves as *the* experts in medicines; their unique role means they can have an impact on any aspect of patient care that involves the use of medicines. Community pharmacists who were interviewed highlighted their distinct place in ensuring medicines safety and providing medicines-related information to patients and other HCPs. The HES data study identified the medicines that are most commonly implicated in medicines-related hospital admissions, and pharmacists are in the ideal position to identify patients at risk. Other studies have also shown that pharmacists see themselves as the HCP with most expertise in the use of medicines (Weiss and Sutton, 2009; Elvey, Hassell and Hall, 2013). Indeed, the GPhC definition of the core role of pharmacists includes ensuring that medicines prescribed to patients are suitable, and advising patients about medicines (GPhC, 2018).

Some patients in the current study were aware of the services offered by community pharmacists and said they would use them; for some this was in preference to their GP due to their community pharmacist's accessibility, without the need for an appointment, and their knowledge about medicines. However, this was not an attitude that was reflected by all patients; a survey of 607 patients by Healthwatch Suffolk found that 29% of respondents thought that pharmacists were not qualified to provide medical advice. Unfortunately, the survey report did not provide any further information about why this was the case (Healthwatch Suffolk, 2015).

Satisfaction with information about medicines has been shown to have a positive effect on adherence (Horne, Hankins and Jenkins, 2001). A study assessing patients' information needs, surveyed 400 people collecting prescriptions from various pharmacies in the east of England and found that patients who had received an extended community pharmacy service, such as a MUR, were twice as likely to be adherent to their medicines and more likely to be satisfied with the information they had received about their medicines (Twigg *et al.*, 2016).

It appears that some GPs may need convincing about how community pharmacists can benefit them and the patients they care for. For example, only 50% of community pharmacists in the current study said that GPs asked them for advice about medicines-related issues and only 54.3% of respondents thought that GPs knew how to find medicines-related information. This suggests that GPs may not be convinced of the skills and expertise that community pharmacists possess. Some authors have postulated that potential barriers to GPs using the skills of community pharmacists include the medical culture or 'turf wars', where it could be perceived that pharmacists duplicate GPs' roles and compete for remuneration (Freeman *et al.*, 2012).

The current study investigated some of the factors that affected the ability of community pharmacists to conduct effective PD-MURs that may have a beneficial effect on reducing medicines-related hospital admissions. As shown in the current HES data study, medicines-related hospital admissions are an increasing problem, and this will become more apparent in the forthcoming years due to an ageing population taking increasing numbers of medicines for multiple medical problems. In 2016, 18% of the UK population was over 65 and it has been estimated that this proportion will increase to 25% by 2046 (ONS, 2017b). Between 1991 and 2011, a population-based study of older people in England found that the number of people taking five or more medicines per day increased from 12% to 49% (Gao *et al.*, 2017). This represents a huge financial burden for the future NHS; partly due to the increased risk of medicines-related hospital admissions and their associated costs with the greater number of medicines taken, but also the time taken for HCPs to prescribe these medicines safely, rationalise patients' medication regimes and educate patients to use medicines most effectively.

Reducing medicines-related hospital admissions and minimising the impact of medicines-related problems is a priority, and as previously mentioned in section 3.4.7, it has been suggested that this could be achieved by utilising the skills of pharmacists in a number of ways:

1. ***Medicines reconciliation at admission and discharge*** – inclusion of the community pharmacist in discharge communication as well as the GP.
2. ***Person-centred patient education*** – a focus on what is important to the patient and presented in a format that is accessible to them.
3. ***Shared decision making*** – ensuring that patients and their carers are involved.
4. ***Follow up with community pharmacy*** – referral from the hospital pharmacy to the community pharmacy for NMS or a PD-MUR.

(Barnett and Blagburn, 2016)

Pharmacists, through their specialised training, see themselves as the experts in medicines and efforts should be made to ensure that patients and other healthcare professionals are aware of their unique knowledge and skills. Community pharmacists need to utilise every opportunity to impart their specialist knowledge about medicines to patients and GPs in a manner that could be considered to be 'self-promotion'. They need to ensure that they talk to patients when they issue repeat medicines and discuss treatment options with GPs, rather than handing out prescriptions with no advice and having solely problem-based discussions with GPs. If they are seen to be offering high-quality medicines advice to patients and GPs, and extended services to patients, their role will become more visible and raise the profile of what community pharmacists can offer. People will get to know them, trust them and use them.

9.2.2 Evidence for MURs and PD-MURs

In the current study only one patient with a long-term condition had participated in a MUR. The patients who had not participated in a MUR reported that they were either not aware of the MUR service or did not think it was something that was for 'someone like them.' This view was also seen in a feasibility study that aimed to recruit and refer patients for PD-MURs, which found that 27.8% of patients refused to participate because they saw no benefit for them in a PD-MUR (Ramsbottom, Fitzpatrick and Rutter, 2016). This study also found that only 3.2% of eligible patients were identified by hospital pharmacists for referral for a PD-MUR (Ramsbottom, Fitzpatrick and Rutter, 2016). A recent evaluation of the discharge medicines review (DMR) service in Wales also found that only 2% of all patients discharged from hospital actually participated in a DMR (Hodson *et al.*, 2018). As well as publicising MURs and PD-MURs and their benefits to patients, there are various other

patient, social, medicines-related and disease-related factors that can influence whether MURs or PD-MURs are acceptable to patients.

At the current time, there is a dearth of evidence for the effects of MURs on 'hard' outcomes such as morbidity or mortality. There is also limited evidence that medication reviews by pharmacists actually have any effect on hospitalisations; a systematic review of studies that investigated medication review and cooperation between the pharmacist and GP found that some studies showed statistically significant decreases in hospitalisations, others no effect and one study an increase in hospitalisations (Geurts *et al.*, 2012). A 2013 systematic review of GP-pharmacist collaboration noted that medication reviews by pharmacists did not show any effect on outcomes such as mortality or hospital admissions, but did lead to improvements on 'soft' outcomes such as knowledge about medicines and adherence (Kwint *et al.*, 2013). Another systematic review that focussed on the role of community pharmacists in the transfer of care of post-discharge patients found that they could have an effect on the identification and resolution of medicines-related problems. The included studies showed that the number of times the patient had contact with the community pharmacist did not make any difference to how effective the intervention was. This emphasised the complex interlinked nature of the various elements involved in a successful intervention delivered by community pharmacists (Nazar *et al.*, 2015).

It has been suggested by multiple authors that a large-scale randomised controlled trial with enough participants to give the study sufficient power, is required to determine whether medication review by pharmacists has any significant effect on 'hard' outcomes such as hospitalisation rates and cost-effectiveness (Bryant *et al.*, 2011; Geurts *et al.*, 2012; Leendertse *et al.*, 2013). Prior to conducting the literature review, the intention for the current study was to conduct a RCT to establish whether PD-MURs had any effect on medicines-related hospital readmissions. When the literature was reviewed, it became apparent that this RCT was beyond the scope of an unfunded PhD study due to the number of patients who would need to be recruited. Some authors have shone a spotlight on the lack of evidence for 'economic, clinical and humanistic outcomes' for community pharmacists' interventions for post-discharge patients. They have warned that if other HCPs gain this evidence, community pharmacists could find themselves excluded from roles in caring for post-discharge patients (Nazar *et al.*, 2015).

9.2.2.1 Post-discharge medicines reconciliation and review provided by pharmacists

The MUR in England is focussed on improving patients' understanding of their medicines, highlighting side effects, improving adherence and reducing waste (PSNC, 2018j); there is no specific guidance to ensure that medicines reconciliation occurs as part of this process. Conversely, in Wales, the DMR service description specifically states that the first part of the consultation with the community pharmacist involves them 'checking that the medicines prescribed in the hospital match those prescribed by the GP' (Community Pharmacy Wales, 2011).

The RPS Transfer of Care Report, published in 2012, highlighted the scale of changes in medication that patients must cope with when they are discharged from hospital:

> 'The likelihood that an elderly medical patient will be discharged on the same medicines that they were admitted on is less than 10%. Between 28-40% of medicines are discontinued during hospitalisation and 45% of medicines prescribed at discharge are new medicines. 60% of patients have 3 or more medicines changed during their hospital stay.'
>
> (The Royal Phamaceutical Society, 2012)

In the current study, several of the community pharmacists interviewed intimated that they did attempt to conduct medicines reconciliation when they knew a patient had been discharged from hospital, by querying medication discrepancies they had identified, although this was not necessarily as part of a formal PD-MUR. The desire of community pharmacists to receive a copy of the full hospital discharge summary when patients left hospital was an acknowledgement that they wanted to know what changes had been made to the patient's medicines and what the current medication regime looked like. In the community pharmacist interviews during the current study, one pharmacist highlighted that problems had occurred when discharge information was entered into the GP record by untrained staff.

There is published evidence to show that medicines reconciliation after hospital discharge has a beneficial effect on patient care. A recently published systematic review and meta-analysis has assessed the effectiveness of medicines reconciliation, rather than medication review, in the community by pharmacists after hospital discharge. The review included 14 papers, but only one considered medicines reconciliation conducted in a community pharmacy; the remainder were conducted in the patient's home or other locations. Four

studies found that the intervention identified and resolved discrepancies in medicines and two studies indicated that medicines reconciliation could reduce the number of ADRs after a care transition. The meta-analysis did not find a statistically significant effect of pharmacist medicines reconciliation on readmission rate, with a RR of 0.91 (95% CI 0.66-1.25); although the authors noted a high degree of heterogeneity amongst the studies. The authors concluded that there were a lack of high-quality studies in this area and at the current time, medicines reconciliation in the community by pharmacists could not be recommended as a way of reducing hospital admissions. There is still a paucity of evidence as to whether this intervention has any effect on 'hard' outcomes such as hospital readmissions, patient outcomes such as morbidity or mortality, or HCP workload (McNab *et al.*, 2018).

Conversely, another systematic review that focussed on medicines reconciliation conducted by pharmacists and initiated prior to hospital discharge found that this did have a statistically significant effect on hospital readmissions (RR 0.81, 95% CI 0.70-0.95), ED visits (RR 0.72, 95% CI 0.57-0.92) and ADR-related readmissions (RR 0.33, 95% CI 0.20-0.53). However, there was no statistically significant effect on mortality (RR 1.05, 95% CI 0.95-1.16). The interventions included in the review were varied and again statistical analysis showed a high degree of heterogeneity for the meta-analysis of readmissions and ED visits (Mekonnen, McLachlan and Brien, 2016). A RCT that was excluded from the meta-analysis by Mekonnen, McLachlan and Brien, (2016) because the results were not presented in a suitable form, investigated the effect of intensive pharmacist-delivered care initiated in hospital and continued post-discharge for patients over 80 years of age in Sweden. The authors found that the intervention reduced ADR-related hospital admissions by 80% (RR 0.20, 95% CI 0.10-0.41) compared to a control group who received standard care (Gillespie *et al.*, 2009).

Although there are promising signs that medicines reconciliation after hospital discharge is advantageous for patients, there still appear to be some reservations about the best HCP to conduct this task. A study of GPs and community pharmacists in Ireland found that although only 40% of GPs had a formal system for medicines reconciliation after a patient moved from one setting to another, 75.4% thought their practice in this area was good to excellent. Furthermore, 74% of GPs and 82% of community pharmacists thought the role of community pharmacists should include the prevention of prescribing problems after a

patient moved from one setting to another (Redmond *et al.*, 2016). This was despite only 22% of GPs thinking that medicines reconciliation after a care transition was best conducted by a pharmacist, compared to the 74% of community pharmacists who thought they were best HCP to perform this task (Redmond *et al.*, 2016). Other studies have confirmed that community pharmacists see medicines reconciliation as part of their role (Kennelty *et al.*, 2015) and some GPs also see this task as something that pharmacists would excel at; Clare Gerada, past chairperson of the Council of the Royal College of General Practitioners, has said:

> 'Pharmacists do medicines reconciliation incredibly well. Why don't they liaise with hospitals before patients are discharged? Why don't they go into hospitals even before they're discharged and put them (medicines) directly on to the record? Why don't they reconcile the hospital record with the GP record when a patient comes out?'
>
> (Sukkar, 2015)

It seems that medicines reconciliation as part of a PD-MUR is important and the service specification in England should be altered to mirror that in Wales, whereby the post-discharge medication review formally includes medicines reconciliation. In the US, community pharmacists have found that medicines reconciliation after a patient has been discharged from hospital is time consuming and some pharmacists have highlighted the lack of reimbursement as a disadvantage (Kennelty *et al.*, 2015). The system of remuneration in England also needs reviewing and this will be discussed further in section 9.2.3.3.

At the current time the HCP best placed to conduct medicines reconciliation and post-discharge medication reviews is the practice pharmacist, as they have access to the patient's discharge summary and medical records. This does not mean that community pharmacists should not be involved in the care of post-discharge patients, rather they should conduct a FD-MUR; a MUR that takes place when the patient receives their first repeat prescription after a hospital admission. The FD-MUR would involve the community pharmacist ensuring the patient was collecting the correct medicines, checking if they had experienced any problems since their medicines reconciliation and medication review with the practice pharmacist, and confirming that their information needs about their new medication regime have been fulfilled.

RECOMMENDATION 1

A practice pharmacist should conduct medicines reconciliation and medication review, in the practice or at the patient's home, as soon as possible after hospital discharge. Details of the review should be shared electronically with the patient's community pharmacist. Patients should have a 'first-dispensing' MUR conducted by a community pharmacist, to check their use and understanding of their medicines when they collect their first prescription after they have been discharged from hospital.

9.2.3 Facilitators and barriers for community pharmacists conducting MURs and PD-MURs

In the current study, there were several factors that affected whether community pharmacists were more or less likely to participate in MURs and PD-MURs. These factors have been distilled down into the following areas: the identification of high-risk patients; clinical skills and knowledge; and incentivisation to complete MURs.

9.2.3.1 Identification of high-risk patients

The targeting of patients at high-risk of a medicines-related readmission to hospital is critical to ensuring that pharmacists' skills benefit the patients in most need. The HES data background work that was part of the current study demonstrated that the medicines most likely to cause a medicines-related readmission have not really altered over a number of years. This knowledge of high-risk medicines could be used as a very crude way of pinpointing patients who may require additional medicines-related support. Community pharmacists who were interviewed and surveyed for the current study also described how they were often unaware that a patient had been in hospital. Therefore, a quick way of identifying patients who may benefit most from a MUR would be to look for those taking high-risk medicines and/or those who have recently been in hospital.

NICE has also suggested that tools such as the Living with Medicines questionnaire, version 3 (LMQ-3) could help HCPs to provide more individualised care to patients (NICE, 2016). When people using community pharmacies in south east England completed the LMQ-3 it showed that those who pay prescription charges, use more than four medicines, take medicines more than twice a day and need support using medicines, have the highest

medicines burden. Interestingly, older people (>65 years) reported lower levels of medicines burden than younger people (Krska, Katusiime and Corlett, 2018).

More complex tools are available that combine a greater number of parameters to identify patients, in the community or in hospital, who are at high risk of a medicines-related admission to hospital. Barnett and Blagburn (2016) have suggested the use of the PINCER tool by GP practices and the PREVENT tool by hospital and community services to reduce medicines-related readmissions. The PINCER tool can be used with GP computer systems to target patients taking high-risk medicines (University of Nottingham, 2018); integration into community pharmacy PMR systems could be one way of identifying patients in a more sophisticated manner.

The use of integrated IT systems would mean that the identification of patients recently discharged from hospital and those taking high-risk medicines would be an easy and straightforward task. At the current time, with a lack of integrated IT systems, this could be achieved by hospitals sending information to community pharmacists using PharmOutcomes or community pharmacy PMRs 'flagging-up' suitable patients. Fully integrated IT systems will be discussed further in section 9.4.1.3 but until they are available, methods for community pharmacists to identify patients in greatest need of medicines support should make more efficient use of time, and use the skills of community pharmacists effectively, especially their specific knowledge about medicines.

RECOMMENDATION 2

Community pharmacists should use their specialised knowledge of high-risk medicines, information about whether their patient has recently been in hospital and an awareness of those who experience the greatest burden of medicine-taking to prioritise patients for MURs. This should be facilitated by currently available IT solutions, and in the future, should be fully integrated across different healthcare providers.

9.2.3.2 Clinical skills and knowledge

The results of the survey showed that community pharmacists were more likely to conduct MURs if they were younger. Younger community pharmacists will have only been qualified since the introduction of MURs in 2005 and will not have worked in community pharmacy

before this time. Participation in MURs is an advanced service that involves the pharmacist working in a more patient-focussed manner rather than in a dispensing or supply function. Younger pharmacists will have been trained in a different way during their undergraduate studies and are more likely to have the skills to enable them to be more confident delivering this type of service. They will also have different expectations of the roles they will undertake in their future careers. For older pharmacists that feel less confident in providing new services, further training may be required to equip them with the requisite skills, such as increased clinical knowledge, medication review, consultations skills and coaching methods for example. This could be through formal training, e.g. a clinical diploma or an independent prescribing qualification or through personal CPD. This finding may be particularly relevant to older pharmacists because the NHS landscape is changing and the roles that pharmacists now find themselves in require additional training to ensure the public have access to pharmacists who are highly skilled and able to pass on their expertise.

Older pharmacists in the survey agreed more with the attitudinal statements around GP and patient views of MURs and what community pharmacists offered over and above the supply of medicines. They were more likely to think that GPs and patients appreciated their additional input into patient care, through their clinical knowledge, and provision of MURs, rather than seeing them solely as the suppliers of medicines. These pharmacists may have been able to build longer-standing relationships with GPs and patients in their locality, but they may also have had more time to gain the skills required to provide advanced services to a high-standard. Younger pharmacists could therefore benefit from further training to equip them with the additional skills they require and allow them to feel more appreciated for their advanced roles also.

To support the effective development of pharmacy the Pharmacy Integration Fund (PhIF) was set up in October 2016, with the aim of ensuring pharmacists and pharmacy technicians had the skills to deliver high-quality, safe, effective services for patients as part of an integrated primary care team (NHS England, 2018b). One of the workstreams it supports is education and development. In 2018/19 the Fund is financing £40million of training for pharmacy professionals in areas including clinical and professional leadership, clinical education, independent prescribing and clinical skills for pharmacists working in general practice (Health Education England, 2018b). These training opportunities should be

utilised by community pharmacists to ensure they have current clinical knowledge and the skills required to serve patients effectively.

The future spending of the PhIF monies has not been determined at the current time; although further funding will be made available, it is not yet clear what it will be spent on (PSNC, 2018n). This fund gives community pharmacists the opportunity to be 'upskilled' and they should make the most of that chance. In terms of how community pharmacists feel about more advanced roles, a systematic review found that most pharmacists viewed the extension of their role as an opportunity for role expansion and professional development (Hindi, Jacobs and Schafheutle, 2018) and this can only be a good thing for patient care.

RECOMMENDATION 3

Community pharmacists should access the Pharmacy Integration Fund to finance formal and informal training, to increase their skills in caring for post-discharge patients. The Fund should also be used to promote innovative ways of working, by commissioning direct services from pharmacists such as first-dispensing MURs or developing IT solutions to facilitate the integration of pharmacy and GP IT systems.

9.2.3.3 Incentivisation to complete MURs

The community pharmacists survey showed that pharmacists working in large multiples conducted more MURs than those working in other types of pharmacy. This may reflect a more commercial, target-driven approach to the recruitment of patients for MURs which pharmacists working for large multiples feel compelled to adhere to. Pharmacists that were interviewed for the current study did talk about external pressures to complete MURs, but also stressed that they still had the professional autonomy to choose the most appropriate patients for the service. This pressure to meet MUR targets has also been reported by community pharmacists in other studies (McDonald *et al.*, 2010; Ferguson, Ashcroft and Hassell, 2011; Latif, Pollock and Boardman, 2013). A change in the way community pharmacists are remunerated for MURs and PD-MURs may be required for the focus to change from quantity to quality.

The time taken to conduct a PD-MUR was also a factor when community pharmacists chose patients for this service. Latif, Pollock and Boardman (2013) found that staff in community pharmacies tended to choose patients who were on fewer medicines for MURs. Pharmacists in the current study also said that PD-MURs were more complex and therefore time consuming to complete than standard MURs. Rutter, Ramsbottom and Fitzpatrick (2017) found that on average a PD-MUR took between 20 and 39 minutes to complete and in their systematic review, McNab *et al.*, (2018) found that post-discharge medicines reconciliation took between 1 hour 27 minutes and 3 hours 51 minutes to complete. The current method of remuneration for MURs encourages pharmacists, if they are under pressure, to select the 'easy' or 'straightforward' patients for MURs rather than considering which patients will gain most benefit as those (PD)-MURs are likely to be more 'difficult' or 'complicated'.

It has been suggested that remuneration should be increased to cover the time and work involved in providing advanced services and pharmacists would be more likely to engage with service provision for greater financial reward. Direct remuneration has also been considered to be an option in some cases (Hindi, Jacobs and Schafheutle, 2018). An alternative method of remuneration has also been suggested by Clare Gerada, whereby, like GPs, pharmacists have a registered list, managing patients with long-term conditions and would be paid in a way that is akin to GPs (Sukkar, 2015).

A change in the community pharmacy contract is required so that the care of post-discharge patients is given greater priority. The current method of remuneration does not incentivise community pharmacists to support every patient who has been discharged from hospital. The lack of PD-MURs conducted by community pharmacists in the current study highlights that community pharmacists can easily reach their MUR annual quota with patients from the other target groups. They do not feel the need to prioritise post-discharge patients, even though they are a vulnerable group with perhaps a greater need for support than patients in the other target groups.

RECOMMENDATION 4

Remuneration for post-discharge medication reviews and support by community or practice pharmacists should be based on the proportion of discharged patients (on four or more medicines) who have their medicines reconciled and, are offered further advice and support with their medicines. This should be done in a similar manner to the GP quality and outcomes framework (QOF) system.

9.3 Relationships

The next overarching theme to emerge from the various phases of the current study was relationships. This was a very broad topic area and encompassed all of the relationships that existed between the patient, community pharmacist and GP as well as others such as family members or carers. The interplay of the relationships that patients found most important to them was complex and varied for each individual. The patient's locus of control also strongly influenced who they involved in decisions about their health, and this along with their level of health literacy determined what health-related information they felt they required. The patient interviews highlighted just how much importance the patient put on their relationship with their GP and how they felt about pharmacists becoming more engaged in their care. The pharmacist interviews and survey emphasised the complex interplay of factors that impact on community pharmacists providing high-quality advanced services to patients and how their role fits into the primary care landscape.

9.3.1 Pharmacists' and patients' relationships

As mentioned in the introduction, the findings of this study have shown that there are a complex network of relationships and the values that patients put on those relationships impact on the behaviour of patients with regard to medicines-taking, accessing the expertise of community pharmacists and accepting the role of the pharmacist in the primary healthcare team. Pharmacists in this study also reported variable levels of engagement with advanced services from patients. All of these factors affect a patient's optimisation of their medicines and their risk of being admitted to hospital because of a medicines-related problem.

The findings from the patient interviews, pharmacist interviews and survey gave an insight into the relationships between the different individuals involved in the care of a patient. These relationships have been summarised in Figure 9-3, which shows the dynamics of the usual relationships that exist and demonstrates that community pharmacists' relationships can be very variable.

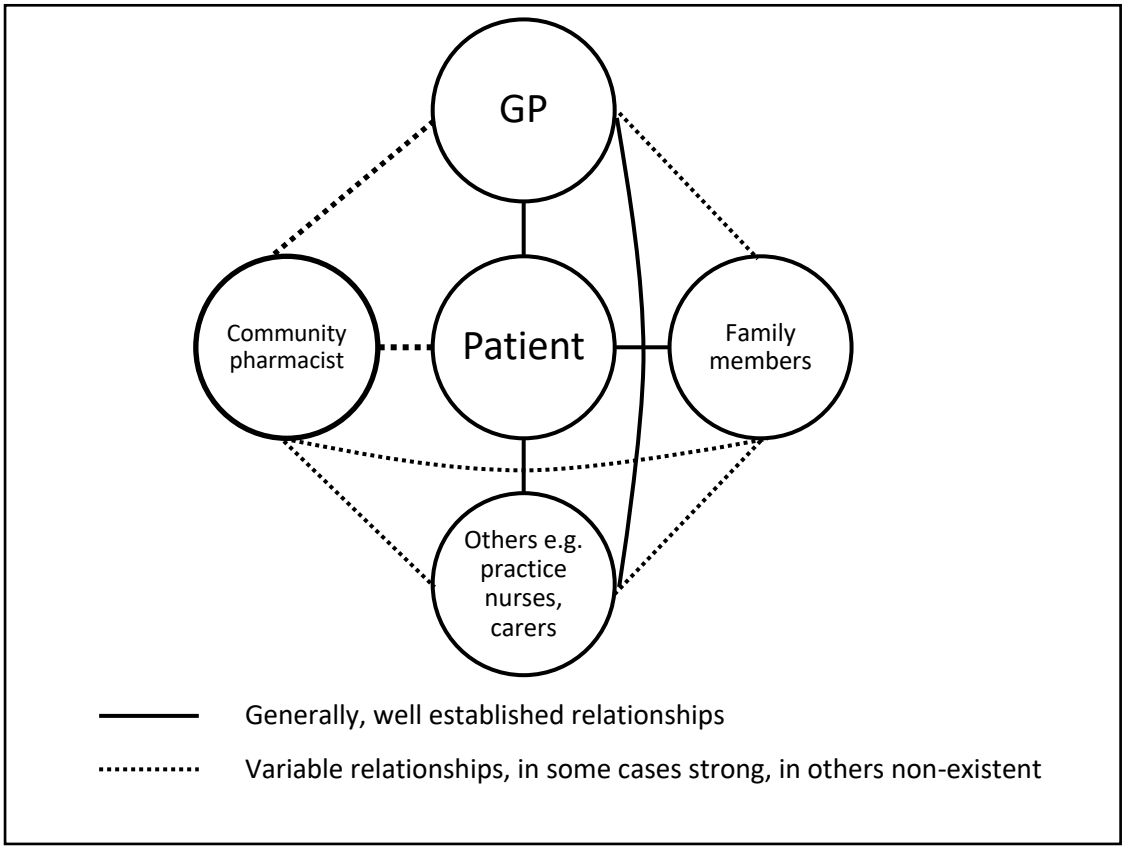


Figure 9-3 Relationships between patients and others involved in their care

At one end of the spectrum community pharmacists could be considered to be on the periphery of care and may find difficulty in building and maintaining relationships; this would be even more apparent for locum community pharmacists. At the other end of the spectrum, in terms of the depth of relationships, some community pharmacists have been able to build strong and trusted relationships with GPs and patients. Indeed, some patients in the current study described how they used a single pharmacy and had a good relationship with their community pharmacist. This familiarity meant they readily asked them about medicines-related issues. This was reflected in the results of a survey of over 1000 members of the general public in England; those who took regular medicines or who used a pharmacy frequently, were more likely to agree to participate in a medicines-related service than the general population (Rodgers *et al.*, 2016).

Another survey of 2661 members of the general public in England about attitudes towards community pharmacies and the services they provide, reported that people over the age of 65, and frequent pharmacy users expressed a preference for using the same pharmacy. They also favoured a pharmacy owned by the pharmacist working there, where they knew

the staff and the staff knew them. They expressed negative attitudes towards pharmacies in supermarkets (Saramunee *et al.*, 2016). This suggests that it is important for community pharmacists to build relationships with patients with the aim of achieving better engagement, particularly with advanced services.

There have been concerns, from the hospital sector, that patients do not use a regular community pharmacy so sending discharge information to the correct pharmacy would be difficult. This appears not to be the case as Urban *et al.*, (2013), have estimated from previous studies that 58-94% of patients use the same community pharmacy consistently. However, this wide-ranging figure emphasises the variation that exists, whereby some patients have a closer relationship with their community pharmacist than others.

From the results of the current study, there is new information about the relationships that community pharmacists are able to build with patients and how this is somewhat dependent on the type of pharmacy they work in. Community pharmacists working in independents and small multiples were more likely to conduct PD-MURs and were also more likely to think that they were able to provide patients and GPs with their expertise compared to pharmacists working in other types of pharmacy. This may reflect the depth of relationships that community pharmacists are able to build with patients and GPs when working in these smaller companies; which may be a consequence of a more static pharmacy workforce and fewer people - both patients and GPs - that they need to acquaint themselves with.

There have been suggestions, from pharmacy representative bodies, that for community pharmacists to be seen as professionals they should have their own clientele and this lends itself to the idea of nomination or registration with a particular community pharmacy (Edmunds and Calnan, 2001). This is the case in countries such as the Netherlands (NHS, 2018), although it should be noted that registering or nominating a community pharmacy there does not necessarily mean continuity, as patients have the freedom to use alternative pharmacies.

Continuity of care from the same GP is appreciated both by GPs and patients, particularly older people, and those with complex health problems (Levene *et al.*, 2018). It has been shown, in a systematic review, that the same GP caring for the patient results in a

statistically significant lower mortality rate (Pereira Gray *et al.*, 2018), increased concordance with medication regimes and lower hospital admission rates amongst other markers (Levene *et al.*, 2018). Extrapolating from this, it would be fair to expect that the same could be true for continuity of care from other HCPs such as community pharmacists, but at the current time there is insufficient evidence that a longstanding patient-pharmacist relationship confers the same benefits.

A potential facilitator for patients to become more familiar with their community pharmacist would be for patients to nominate their preferred community pharmacy. This already occurs when patients specify which pharmacy they would like to dispense their regular medicines if they use the electronic prescription service (NHS Digital, 2018c). This should become more formalised with all patients nominating a pharmacy and this being formally recorded in the medical records, community pharmacy records, and therefore also the summary care record. This will be discussed further in section 9.4.1.1. Referrals to secondary care should automatically include this information. A process allowing both primary and secondary care HCPs to have read and write access to this record should also be enabled. This would mean that any pertinent medicines-related information about the patient would be accessible to all HCPs involved in a patient's care, although it is acknowledged that this is an idealistic aspiration at the current time.

9.3.1.1 Patients' HLOC, health literacy and the effect on relationships

Findings from the current study suggested that, from a patient's perspective, the relationships they have with HCPs and their family in relation to their health was influenced by their HLOC and level of health literacy. Figure 9-4 shows the HLOC and levels of health literacy for patients interviewed in the current study.

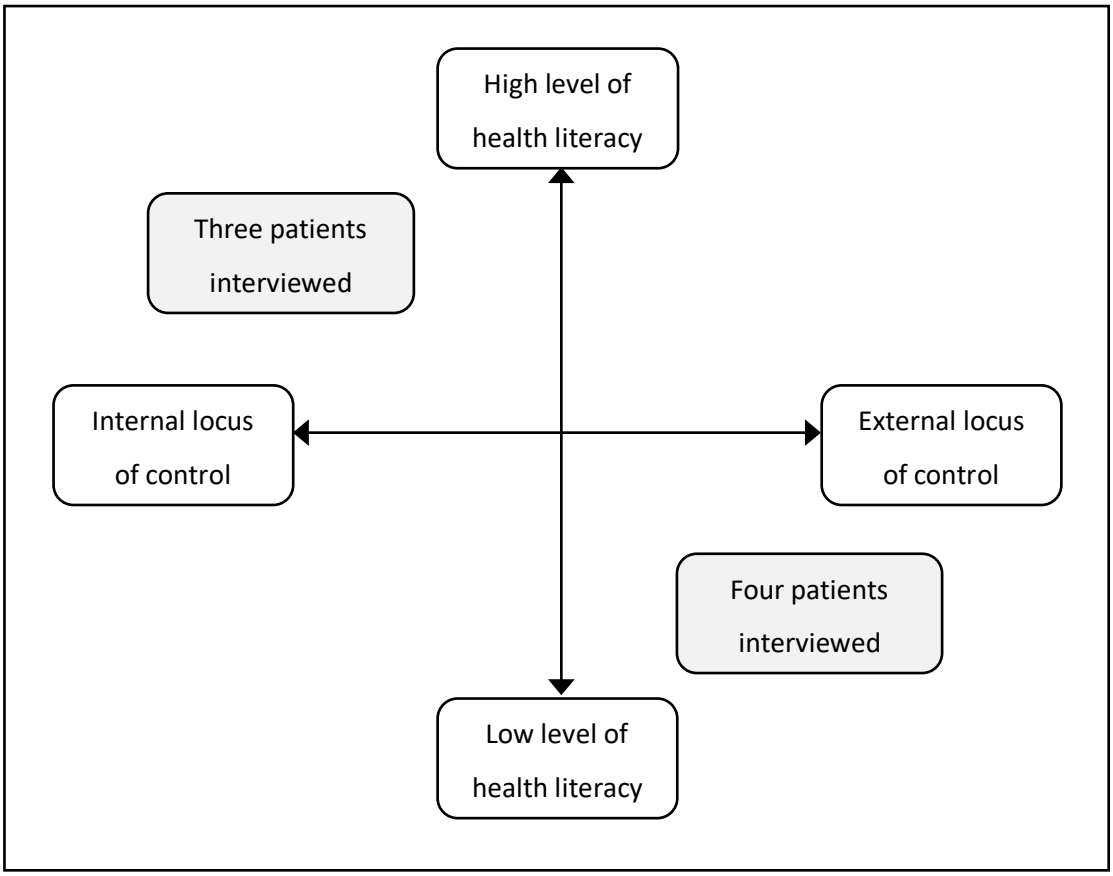


Figure 9-4 HLOC and health literacy of patients interviewed

The patients interviewed fell into two distinct categories, with either a high level of health literacy and internal locus of control or, a lower level of health literacy and an external locus of control.

There have been few studies that consider HLOC and health literacy and the links that may exist between the two constructs, and this area warrants further investigation. A national survey of Taiwanese adults considered self-efficacy, or the ability to improve and maintain health, and how health literacy and HLOC affected it (Tsai, Lee and Tsai, 2015). The study of over 3 500 people found that individuals with low levels of health literacy were more likely to depend on others and have an E-HLOC compared to those with high levels of health literacy, who were more likely to have an I-HLOC. The authors postulated that people with higher levels of health literacy had more ability to work their way through the health system and attributed their health status to their own actions rather than due to chance (Tsai, Lee and Tsai, 2015). They found that although there were links between health literacy, HLOC and self-efficacy, these were all independent factors and represented

different aspects of a person's behaviour (Tsai, Lee and Tsai, 2015). The importance of empowering patients and encouraging an I-HLOC was underlined by a RCT of 136 older patients in Australia, who had been discharged from hospital into transitional care. It found that those with an I-HLOC had a better quality of life and physical functioning 12 months after hospital discharge compared to those with an E-HLOC (Milte *et al.*, 2014).

These studies suggest that modification of HLOC from external to internal would benefit patients' long-term health prospects. It may not be possible for all patients to have an I-HLOC so for some, an E-HLOC with some features of an I-HLOC may be appropriate. If a patient has an E-HLOC it may be beneficial if the doctor supports them in making health-related decisions but also puts the emphasis on empowering them to have the confidence to also make some beneficial decisions themselves such as losing weight, giving up smoking or adhering to their medicines, which would benefit their long-term health.

For health literacy, it is already known from systematic reviews that patients who have low health literacy are more likely to have difficulties taking their medicines properly, problems reading the labels on medicines, have poorer health status, be more likely to be admitted to hospital and have higher mortality rates than those with higher levels of health literacy (Berkman *et al.*, 2011). Further systematic reviews and meta-analyses have also shown that higher levels of health literacy are associated with better medicines adherence. Although the authors suggest that beliefs about medicines, patient knowledge and communication between the patient and HCP can also affect medicines adherence (Zhang, Terry and McHorney, 2014). This was borne out in the current study as the patients who appeared to demonstrate lower levels of health literacy reported difficulties managing their medicines and relied on others to help them with this function. A relatively old paper from 1990 that investigated the information needs of patients reported that patients differed in how they dealt with their conditions and the treatments they were given. They suggested that patients required different amounts and types of information at the various stages of their condition and they postulated that if the communication from the HCP had been poor and not tailored to the patient, providing written information would not have any effect on adherence (Weinman, 1990). Unsurprisingly, the current study showed that patients varied in their opinions about the level and quantity of medicines-related information they required.

Community pharmacists are in an ideal position as HCPs to increase the health literacy of patients. They may be viewed by patients as being more approachable than GPs, they are seen frequently, and they are more accessible. Measures to improve health literacy would enable patients and their families to gain more control of their health and medicines-taking. All HCPs should use interactions with patients, no matter how brief, to encourage patients to have confidence in their own health literacy and provide information/interventions to facilitate this, ideally using an approach and information that is tailored to the needs of the individual. This could take the form of an individual medicines review; the use of different consultation approaches such as 'teach back' or 'chunk and check'; or, if time and resources allowed, an informal group education session. NHS Scotland has excellent resources on its website 'The Health Literacy Place' (http://www.healthliteracyplace.org.uk) and these resources could be used to assist community pharmacists to have more patient-centred consultations.

By providing tailored patient information in the most appropriate way, patients will become more knowledgeable about their medicines and conditions. The hope would be that this should increase their confidence and perhaps even nudge them into having more control over their health. However, it should be noted that even if patients are given information that is individualised, there is no guarantee that this will affect how they take their medicines. One study of community pharmacists found that they felt that patients would not necessarily disclose exactly how they took their medicines, meaning that the pharmacist's ability to change behaviour was limited, as once the patient was at home, they would choose how they used their medicines (Latif, Waring, *et al.*, 2018).

RECOMMENDATION 5

Community pharmacists should use the guidance contained in the NICE clinical guideline on medicines adherence (NICE, 2009) to engage with patients to determine the amount, depth and level of information they need according to their health beliefs and level of health literacy. This would empower patients to gain the most benefit from their medicines.

9.3.1.2 Patients' views of pharmacists providing advanced services

In this study there were three different standpoints with regard to engagement with MURs from the seven patients that participated in the interviews. The first group were 'participants'; they had participated in a MUR and valued the knowledge and input of their community pharmacist in their care and were willing to participate in the service again. The second were 'willing participants'; they were not aware of the MUR service, although when informed about the concept, appeared to be receptive to participating in future. The final group were 'unwilling'; they did not think MURs were for them because they felt they could not cope with the information given, were not interested, or thought that their GP was superior in status and knowledge to the community pharmacist, so they would not utilise the expertise of the community pharmacist. This final standpoint was also seen in a feasibility study that investigated the referral of patients to their community pharmacist, specifically for a PD-MUR, which found that 32% of older patients refused to participate in the study with the most commonly cited reason being that they did not see the benefit in having a PD-MUR with their community pharmacist (Ramsbottom, Fitzpatrick and Rutter, 2016).

There appears to be a lack of awareness on the part of patients about the MUR service. In the current study only 32% of community pharmacists thought that the majority of patients were aware of MURs. There have been various published studies that have demonstrated that the general public are unaware of the advanced services provided by community pharmacists. A survey of the general population in south east England, not just patients who frequented pharmacies, which asked about willingness to use the advanced services provided by community pharmacists, demonstrated that only 18.2% of people were aware of MURs and 8.6% the NMS service (Rodgers *et al.*, 2016). A systematic review of patient and public perspectives of community pharmacies found that patients viewed their community pharmacy as the place to have medicines dispensed and to get advice on the treatment of minor conditions and there was low knowledge amongst patients and the public about the advanced services that community pharmacies offered (Hindi, Schafheutle and Jacobs, 2017).

Conversely, there are also several studies that show patients accept community pharmacists as part of the healthcare team and highlight the qualities that meant they were comfortable discussing their medicines-related issues with them. When members of

the public were asked whether they would be willing to have a discussion with a community pharmacist because they had recently been discharged from hospital, 65.6% of people agreed they would (Rodgers *et al.*, 2016). In a synthesis of qualitative studies about the role of community pharmacists, pharmacists were seen to be friendly, accessible and helpful and patients felt they could discuss issues with them that they had not been able to with their GP (Hall, Donovan and Wilkes, 2018). Members of the general public who had experienced advanced pharmacy services said their opinion of what the pharmacist could offer had changed, so they would be more likely to use them in future because they were more accessible and had more knowledge about medicines than the GP (Rodgers *et al.*, 2016). This view was reflected by the patient in the current study who said they would ask the pharmacist about their medicines, in preference to the GP, because in the past they had not got the answer they wanted from the GP.

There does appear to be some confusion from patients about the purpose of the MUR and worryingly that was apparent even when the patient had participated in a consultation. In this study, even when the service was described to patients, some required further clarification to determine whether or not they had participated in a MUR. In one postal survey of over 300 community pharmacists in England, 46.3% of pharmacists thought that even when patients agreed to have a MUR, they were not aware of its purpose (Rodgers *et al.*, 2016). When the MUR and NMS service was described to the general public to explore their willingness to participate; 53.2% (Rodgers *et al.*, 2016) of people said they would use the service as they were 'wanting to help the pharmacist' (Latif, Boardman and Pollock, 2013; Rodgers *et al.*, 2016). Even when patients have had a MUR with a community pharmacist, some reported that they felt it had not changed how they used their medicines or increased their knowledge about their medicines (Latif, Boardman and Pollock, 2013).

To increase the knowledge of patients and the general public about MURs and in particular PD-MURs, publicity is required. This was also one of the recommendations from a systematic review investigating community pharmacy users' opinions about the contribution of community pharmacy to improving public health, which suggested that more active promotion is required to alert the public to the role of community pharmacists in providing general health advice (Anderson, Blenkinsopp and Armstrong, 2004). Careful consideration is required as to how this is achieved to ensure maximum effectiveness. A survey of 2661 members of the general public in England found that when promoting

lifestyle advice and cardiovascular screening by community pharmacies, people were more likely to engage with these services if they had received a personal recommendation of the service from a HCP, family member or friend. They also reported that advertising using posters and leaflets was preferred over mass-media methods such as newspaper or radio advertising (Saramunee *et al.*, 2016). A national survey of over 2000 members of the general public about medical information in 2016 found that 65% of people thought that their friends' and family's experiences were a trustworthy source of information (ComRes, 2016). In the current study, the patient who had participated in a MUR said they would recommend it to others and would attend again themselves. This shows how powerful a personal recommendation can be and how important social relationships are to patients.

Professional bodies, for example the RPS, should take the lead and work with trade organisations such as the NPA and the PSNC and health service organisations including NHS England and local CCGs, to co-ordinate efforts to publicise the advanced services on offer in community pharmacies to patients. Commissioning new services such as FD-MURs would help to provide authentication and validation of the service from the patient's point of view. A range of other publicity methods should also be employed including, posters, verbal endorsement by GPs, the use of technology such as screens in GP surgery waiting areas, and social media, through targeted, promoted posts on Twitter, Facebook and Instagram. Strategies are already being employed by various organisations for this purpose, but continued and expanded efforts are required. Patients who have taken part in advanced services should be encouraged to share their experiences with their peers to also increase awareness and uptake. The overall aim of any publicity should be to increase uptake of advanced services which would have the knock-on effect of promoting the service through word-of-mouth from those who have taken part.

RECOMMENDATION 6

The role and skills of community pharmacists should be promoted to patients through advertising, word of mouth, endorsement from other HCPs and commissioning of novel services, such as first-dispensing MURs. Community pharmacists should be seen as the first 'port of call' for patients who require assistance with any aspect of managing their medicines.

9.3.1.3 Domiciliary medication reviews by pharmacists

For some patients, even if they are aware of PD-MURs, there are practical issues that make it difficult for them to attend their community pharmacy to participate. A study from south east England aimed to educate hospital in-patients about the availability of PD-MURs when they left hospital by giving them leaflets during their admission and at the time of discharge; this was to encourage them to attend their community pharmacy for a PD-MUR. Of the 83 patients who completed the study, 47% were aware of MURs prior to their admission but after discharge only 7% had participated in one. The main reason for not attending a PD-MUR was due to morbidity or mobility problems (Lam, Dodds and Corlett, 2016). In the current study, no patients were followed-up, so it was not possible to determine whether they had participated in a PD-MUR or not. If patients experience a period of reduced mobility or excess morbidity the availability of domiciliary PD-MURs would be a useful option.

The HMR service in Australia, which has been in existence since 2001 (Pharmaceutical Society of Australia, 2011), could provide a framework for initiating this service in England. Australian GPs refer patients to pharmacists for this service and there is good evidence that it reduces drug burden and increases appropriateness of medicines. Sadly, there is still a lack of evidence to show the effect on clinical and patient reported outcomes (Chen, 2016).

In the UK there is scant evidence from small-scale studies that home medication review can realise economic benefits as well as improved clinical outcomes. The studies quoted below all suggest that home medication review results in cost-savings, however, all of the included studies used expert opinion to determine whether a hospital admission was avoided and then extrapolated to calculate the predicted cost savings, therefore subjectivity must be considered as a potential issue. An evaluation of the Exeter Cluster Clinical Pharmacy service in south west England, which provided home medication reviews for frail older people referred by their GP, found that 79% of the patients seen were not able to get to the GP surgery or community pharmacy to discuss medicines-related problems. Prior to the medication review, 76% of these patients were at high-risk of developing medicines-related problems. The population served by the scheme was 145,000 and it was estimated that the scheme prevented 109 hospital admissions per year and saved £100,000 per year for the health economy (Dilks *et al.*, 2016). In London, a scheme where clinical pharmacists conducted domiciliary clinical medication reviews, assessed 268

patients and made 1741 interventions over an 18-month period. Of the interventions, 2% prevented harm or hospital admission and the authors estimated that this saved the NHS £128,556. Of the patients who had participated in the reviews, 91% were highly likely to recommend the service to family and friends (Central London Community Healthcare NHS Trust, 2018). A further study conducted in central England found that when community pharmacists conducted domiciliary MURs, they self-reported that a hospital admission was possibly or likely prevented for 35.3% of patients (Latif, Baguiasri, *et al.*, 2018).

Despite the fact that patients recently discharged from hospital are in one of the target groups for MURs, this population are still underserved. In the current study very few pharmacists reported completing PD-MURs, and only one of the patients interviewed had ever had a MUR of any type. The MUR service has also been found to not fulfil the needs of other marginalised groups within the general population such as people with disabilities, the housebound and refugees, amongst others. A recent study found that those who are socially isolated lacked support in regard to their health and for people who belonged to more than one marginalised group this presented greater barriers (Latif, Tariq, *et al.*, 2018). Domiciliary medication reviews would be one way of helping to support these marginalised groups.

This concludes the subsection on patient relationships, the next sub-section will focus on interprofessional relationships.

9.3.2 Pharmacists' and GPs' relationships

9.3.2.1 GP superiority and HCP hierarchy

Despite community pharmacists and GPs being core members of the primary healthcare team, there are still attitudes and opinions that inhibit these relationships and hamper optimal teamworking. A situation of mutual respect for each other's skills and roles they can play in patient care should be the starting point for this relationship, but unfortunately this does not always seem to be the case. In the current study community pharmacists were ambivalent when asked whether they thought GPs had a high regard for the contribution they could make to patient care. Community pharmacists in other studies also report similar feelings; a study of community pharmacists' and GPs' views about collaboration in Germany found that often community pharmacists surmised that GPs had

negative opinions about episodes of contact with them and thought their requests were 'invasive and controlling' (Löffler *et al.*, 2017).

Although these results are not based on research with GPs themselves, they emphasise how community pharmacists think GPs view them. This highlights the significant obstacles that must be overcome to achieve a successful, professional, relationship of equals. When lay people and HCPs are asked about the contribution that community pharmacists can make to patient care, traditional views are still firmly held, whereby the GP is seen as superior and the community pharmacist, subordinate to the GP (Hall, Donovan and Wilkes, 2018). GPs themselves believe they have a higher status than community pharmacists and hold a more powerful position (Rieck, 2014).

The superiority that GPs feel could be linked to their opinions about, and previous experience of, working with community pharmacists. Studies of GPs' opinions of pharmacists have found that GPs perceive pharmacists to lack the knowledge (Rieck, 2014; Hindi, Schafheutle and Jacobs, 2017; Löffler *et al.*, 2017), training (Hindi, Schafheutle and Jacobs, 2017) and the competence required to provide advanced services such as MURs (Hindi, Jacobs and Schafheutle, 2018). Furthermore, some GPs thought that extended community pharmacists' activities should be supervised and authorised by GPs (Hindi, Jacobs and Schafheutle, 2018). Interviews with prescribers working in primary care have found that sometimes limits have been imposed on pharmacist prescribers by GPs, which further strengthens the GPs' status at the top of the medical hierarchy (Weiss *et al.*, 2016).

These negative opinions are possibly based on previous encounters GPs have had with community pharmacists. Often community pharmacists contact GPs when they have a query about a prescription, meaning that the interactions are inherently brief and problem-orientated. The studies presented in this section demonstrate the difficulties community pharmacists can face when attempting to build collaborative relationships with GPs; indeed, some of these views will be so firmly held it may be difficult for community pharmacists to change them.

In Lewisham, a programme called 'Walk in my shoes' was developed as an inter-professional exchange project where community pharmacists, GPs and practice staff spent time in each other's location of work (NHS Lewisham CCG, 2016; PSNC, 2017). The scheme

helped the different staff groups to understand each other's roles, work more closely together and work out how to streamline processes so patients got better care (NHS Lewisham CCG, 2016). Projects such as this could be rolled-out in other locations.

9.3.2.2 The professional status of community pharmacists in the primary healthcare team

Community pharmacists have high levels of expertise, as shown by the estimated reductions in hospital admissions after domiciliary MURs (Dilks *et al.*, 2016; Latif, Baguiasri, *et al.*, 2018). They are keen to support patients in their medicine taking, but it appears that often others see them as merely the suppliers of medicines. This was evidenced by community pharmacists who took part in the interviews and also in the survey; 57% of community pharmacists thought that GPs saw them as just the suppliers of their patients' medicines. This stance was also seen in a qualitative study that included community pharmacists, pharmacy staff, patients and pharmacy stakeholders; it was found that GPs could present themselves as diagnosticians and consultants whereas community pharmacists were seen to be implementing the GP's decisions and as little more than 'sales technicians' (Rapport *et al.*, 2011).

In other studies, GPs have viewed community pharmacists more negatively due to the commercial aspect of their role, whereby income can be generated from offering professional services (Urban, Rivers and Morgan, 2008; Hindi, Schafheutle and Jacobs, 2017). In the current study, community pharmacists' professional autonomy to choose patients was somewhat compromised by a requirement to complete a certain number of MURs, rather than being able to choose those patients who would gain most benefit despite the MUR consultation taking longer; for example, if patients had a complex medication regime. This conflict in the community pharmacists' role coupled with the commercial nature of running a community pharmacy meant that GPs viewed them as lower in the hierarchy, compared to other HCPs such as themselves, nurses or physiotherapists, who provided their professional knowledge without any prospect of financial gain (Rieck, 2014). Community pharmacists themselves thought that GPs were sceptical about the value of MURs and GPs thought community pharmacists may be using them as a method of income generation (Urban, Rivers and Morgan, 2008). A systematic review also found that GPs had concerns about the possible financial motives of community pharmacists (Hindi, Schafheutle and Jacobs, 2017). This view was also seen in

GPs who expressed negative views about the NMS service; they thought it was unnecessary, they were unclear about the benefits to patients and dubious about the community pharmacists' intentions (Latif, Waring, *et al.*, 2018).

These professional perceptions seem to have affected how community pharmacists choose to engage with GPs in their locality. Some community pharmacists who already have good working relationships with GPs are keen to maintain these relationships. A systematic review found that when a good GP-community pharmacist relationship existed, there was evidence that community pharmacists were not pursuing MURs so vigorously, so as not to harm that relationship (Hall, Donovan and Wilkes, 2018). There was also a conflict between the perceived benefits of the MUR service; pharmacists felt that the main benefit to GPs was a reduced workload, but GPs were not convinced that this was the case (Hindi, Jacobs and Schafheutle, 2018). This shows the desire of community pharmacists to assist GPs and provide high-quality services but demonstrated the difficulty in trying to convince GPs of the benefit of advanced services. Other pharmacists felt that the 'top-down' pressure they experienced to conduct high volume, rather than high quality MURs, undermined the service and would affect how patients and GPs perceived it (Hall, Donovan and Wilkes, 2018). The difficulties of the community pharmacist-GP relationship were also demonstrated in the current study where one pharmacist said they asked patients to liaise with their GP to resolve medicines-related problems rather than them making direct contact themselves.

Community pharmacists are aware of professional boundaries and do not want to impinge on the territory of GPs (Edmunds and Calnan, 2001). In one systematic review community pharmacists thought that the general public were not clear about their extended roles and they could be viewed as crossing GP boundaries (Hindi, Jacobs and Schafheutle, 2018). Indeed, one patient interviewed in the current study also felt that their GP should 'approve' any changes to his medicines suggested by a community pharmacist or even changes to his prescription made by another doctor. An evaluation of the NMS in England found that some community pharmacists felt the service impinged on the GPs' role (Latif, Waring, *et al.*, 2018).

Initiatives to increase the professional status of pharmacists in general and particularly community pharmacists are required. A report of a qualitative study of community

pharmacists' professionalism concluded that 'the public are surprised by the pharmacists' degree of knowledge, especially in relation to the GP' (Rapport *et al.*, 2011). Initiatives to expand the role of community pharmacists should enhance their status, but as with the introduction of pharmacist prescribing this has not necessarily been the case. One qualitative study of pharmacist prescribers found that some community pharmacists welcomed their prescribing role as they felt it enhanced their professional status, whilst others felt it had made no difference; furthermore, a proportion still felt they should have final approval from the doctor for their prescriptions (Weiss and Sutton, 2009).

Even though pharmacists are highly trusted members of the healthcare team, their professional status appears to be somewhat constrained by others' perceptions of their traditional supply role (Britten, 2001). This can only be changed by education of others and familiarity with pharmacists in new roles. An appreciation of the role of community pharmacists by GPs is required to attempt to change the mindset that some GPs appear to have. Commissioning of novel services, perhaps as pilots initially, to encourage and compel HCPs to work together differently would force others to take notice of the skills that community pharmacists can bring to the primary health care team. There is further discussion of interprofessional working in section 9.3.2.4, including strategies to increase collaboration between pharmacists and GPs. Also, students embarking on careers as HCPs in any field, should experience interprofessional learning at undergraduate level, as is happening in some places currently.

Collaboration between the RPS, the NPA and the British Medical Association (BMA) should be encouraged. Previous collaborations have taken place between the NPA and the GP committee of the BMA who published a toolkit for improving communication between community pharmacy and general practice (NPA & BMA, 2009), and the PSNC, Pharmacy Voice and the GP committee of the BMA who provided information about advanced pharmacy services (BMA, 2018). The RPS and the Royal College of General Practitioners (RCGP) have collaborated on the production of a policy statement on GP practice-based pharmacists (The Royal Pharmaceutical Society, 2015). These collaborations should be built upon in future to further advocate joint working.

9.3.2.3 GPs' awareness of advanced services provided by community pharmacists

In the current study, some community pharmacists that were interviewed stated that they thought GPs were not aware of the different services that they offered. They also said that when they did make suggestions to GPs about adjusting medicines following a MUR, they did not get any feedback. This was despite 91% of community pharmacists saying they thought GPs should inform them of the outcome of their recommendations made after a MUR. This underlines the problems with the current MUR system and highlights the potential for better community pharmacist-GP relationships to improve the system for the benefit of patients.

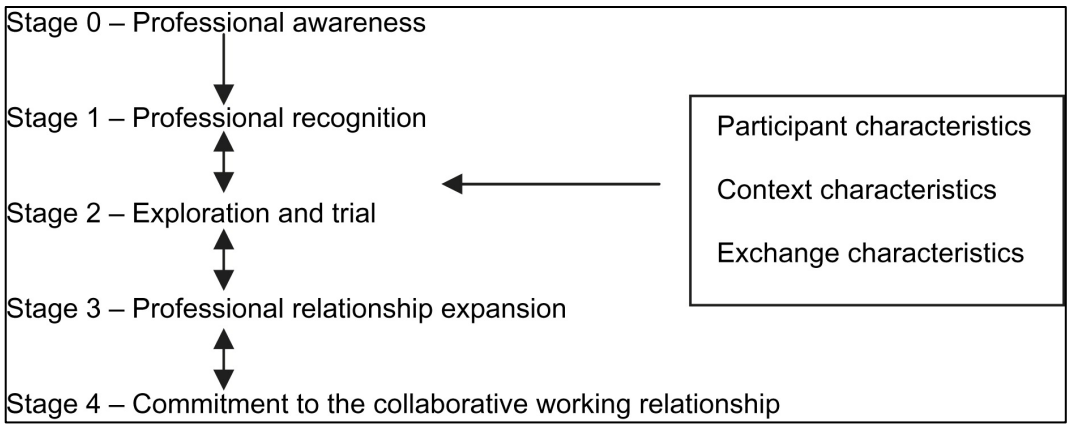
It has been shown that there is low awareness amongst GPs about the extended services that community pharmacists offer (Hindi, Schafheutle and Jacobs, 2017; Hall, Donovan and Wilkes, 2018; Hindi, Jacobs and Schafheutle, 2018). Both pharmacists and GPs thought collaboration could be improved through better relationships. Pharmacists also felt that recommendation of their services by other HCPs would be the best way of raising awareness of extended services (Hindi, Jacobs and Schafheutle, 2018), which was also seen in the current study. Another way to enhance collaborative working could be to incentivise the MUR service. Latif, Pollock and Boardman (2013) suggested that MURs and similar services should be incorporated into the QOF measures as a way of encouraging GPs to engage with them.

The remuneration for community pharmacists conducting a FD-MUR should be revised, as mentioned in section 9.2.3.3 and recommendation 4, to a system where payments are made for the proportion of patients that have medicines reconciliation and medication review with the practice pharmacist and a FD-MUR with the community pharmacist. This would help to put the focus on quality of post-discharge care and shift it away from a purely commercial motivation. Obviously, there would need to be some valid exclusions to the payment system as some patients may refuse to participate, others may require domiciliary PD-MURs and others may require input from the GP themselves. This focus on quality of care would also mean that GPs would have a reduced workload in caring for patients recently discharged from hospital, as the technical details of reconciling the patient's medicines, updating the repeat prescription template and supporting and educating patients would be conducted by pharmacists in the practice and the community pharmacy.

9.3.2.4 Interprofessional teamwork

In the current study only 18.5% of respondents thought that GPs had a high regard for the contribution that community pharmacists could make to patient care. Even though GPs were not asked for their opinions in the current study, an evidence-based approach to improving interprofessional relationships would be advantageous to community pharmacists working as part of the primary care team. Some authors have suggested that in teams where each prescribing professional, whether that be GPs, nurses or pharmacists, were respected for their different skills and appreciated as part of the team, they were more likely to have a positive impact on patient care (Weiss *et al.*, 2016). This mutual respect would appear to be the minimum starting point. Other authors, through systematic review, have suggested methods for increasing and improving interprofessional relationships by focussing on factors such as: flexibility, feeling part of the team, support for innovation, having a team vision or goals, quality audit, recognition, group problem-solving, team meetings, decision-making processes, open communication, supportive colleagues, and having champions or facilitators (Mulvale, Embrett and Razavi, 2016).

McDonough and Doucette (2001) have devised a model for collaborative working relationships between doctors and pharmacists as shown in Figure 9-5. They postulated that as the relationship increased, there were more contributions from each party and the relationships became stronger (McDonough and Doucette, 2001).



Adapted from McDonough and Doucette, 2001, reproduced with permission

Figure 9-5 Staged Approach to Developing the Pharmacist-Physician Collaborative Working Relationship

Other authors have also built on this model using qualitative techniques with pharmacists and GPs to establish the factors that lead to better collaborative working. They devised a more comprehensive list of elements including: locality, service provision, trust, 'knowing' one another, communication, professional respect and acknowledgement of professional roles which affect the pharmacist-GP relationship. They also acknowledged that there is a mismatch between the power and status of pharmacists and GPs (Bradley, Ashcroft and Noyce, 2012). It takes time and effort to build the sort of collaborative relationships that are represented by stage four in Figure 9-5 and Bradley, Ashcroft and Noyce, (2012) have highlighted that this is more difficult when pharmacists are working part-time or there is regular locum cover in a pharmacy.

It appears that with the increasing complexity of patients and workload of GPs, GPs would like the support and assistance of knowledgeable pharmacists, but this can only be achieved if GPs trust and value them, both as individuals, and as a profession (Löffler *et al.*, 2017).

Teams including community pharmacists and GPs should be promoted and the principles of improved interprofessional collaboration should be championed as a way of improving how the team works for the benefit of patients. Teams should start working on small, manageable, pilot projects that will benefit patients in their locality initially, and then move on to bigger and more complex issues or wider geographical areas. Localities where interprofessional primary care teams have achieved improved patient outcomes should be used as examples for other areas to follow; this could be through dissemination of the methods and results from the successful implementation of projects such as those that have been awarded Health Service Journal or other awards. Pilot collaborative projects conducted by researchers and supported by research funding could establish the evidence base for what is effective to then allow professional groups to gain financial support from the PhIF or CCGs to establish and maintain these schemes in practice.

Interprofessional education and training of pharmacists, doctors and other HCPs already occurs at undergraduate level, but postgraduate integrated training and development in locality areas would also be beneficial. This should also be promoted through initiatives such as Training Hubs where the educational needs of the multi-disciplinary primary care

team are met by bringing together different parties such as NHS organisations, local authorities and community providers (Health Education England, 2018c). Different areas have implemented various projects to enable their teams to work more collaboratively so best practice should be shared, to allow other areas to learn from the more well-established learning hubs.

The role and skills of community pharmacists should be promoted to GPs. This should be achieved through the commissioning of pilot programmes focussed on medicines-related issues such as:

- highlighting and implementing best practice in Government documents, for example:
    - sending discharge information to a patient's community pharmacy and/or ensuring extra support is available through pharmacist counselling or telephone follow-up for discharged patients (NICE, 2015c).
    - the prevention of medicines-related adverse events through the implementation of principles from the PINCER study or use of the STOPP/START criteria (NICE, 2015c), facilitated by enhanced IT solutions.
- interprofessional learning, at both undergraduate and postgraduate levels, for example:
    - compulsory undergraduate interprofessional training.
    - shared learning from medicines-related patient safety incidents (NICE, 2015c).
    - using toolkits such as 'Walk in my shoes' to identify and collaboratively resolve locally agreed medicines-related issues (PSNC, 2017).

RECOMMENDATION 7

The role and skills of community pharmacists should be promoted to GPs, facilitated by regular, personal contact. This should be achieved through the commissioning of pilot programmes focussed on medicines-related issues and interprofessional learning. Representative organisations, such as the RPS and BMA, should jointly publicise successful pilots to their members to aid in the dissemination of best practice.

9.3.3 The GP-pharmacist-patient triumvirate

The success of MURs is not only dependent on collaborative working between the GP and community pharmacist; it is a triumvirate that also includes the patient. All three individuals need to work together to ensure that the patient is empowered to use their medicines effectively and safely to maximise the benefits of the medicines prescribed. For this to occur, there must be a partnership between the people involved. This current study has shown that on the whole this is not the case; patients are not always willing to fully engage with community pharmacists as they perceive that their GP holds the power for prescribing and modifying their medicines. They have certain views about the role a community pharmacist should play in their care and this generally involved dispensing medicines rather than providing advanced services. This was also reflected in what the community pharmacists reported when they described how it was difficult to approach and recruit patients for MURs and also to engage GPs in the resolution of interventions raised during the MUR process.

Patients' experiences of the interactions between GPs and community pharmacists and their perceptions of how each profession views the other also influence which healthcare services and sources of information the patient uses and how they access them. The patients' opinion will be framed by their perception of:

1. ***the quality of care provided by the different HCPs*** - when patients reported excellent service from their GP, they were more likely to feel that they did not need the input of a pharmacist (Hindi, Schafheutle and Jacobs, 2017).
2. ***which HCPs perform which tasks*** - a study of the burden of medicine taking by patients with long-term conditions established that 15.7% of patients in the study thought their GP did not listen to their opinion about the use of medicines and 20.6% felt the GP did not give them enough information about the medicines (Krska, Katusiime and Corlett, 2018); these 'gaps' could be filled by the patient consulting their community pharmacist.
3. ***the relationship between HCPs*** - in a survey of 1000 members of the general public, nearly three-quarters (73.3%) of respondents said they would prefer to use a community pharmacy where the pharmacist had a good relationship with their GP surgery (Gammie *et al.*, 2016). Furthermore, if the patient does not think the GP promotes or values MURs, they will be less likely to participate in one themselves. A RCT of a complex intervention that included GP education, pharmacist

> medication review and case conferences to identify and resolve medication-related problems did not find any significant effect on patient outcomes but 92% of GPs and 94% of pharmacists thought the intervention had benefitted patients (Sorensen *et al.*, 2004). The high satisfaction rate of both groups of HCPs involved in this collaborative intervention would result in all HCPs promoting the service and giving patients confidence in the services provided by HCPs other than GPs.

Participants in the patient interview phase of the current study with high and low levels of health literacy displayed some of these behaviours, such as some of those with an E-HLOC thinking that the GP was supreme or the patient with an I-HLOC who felt that their GP held the power to change prescriptions and would want their GP's approval for any changes in medication, hence there was no point seeing the community pharmacist. It appears that this viewpoint is not uncommon as patients in other studies have also reported that they would want the GP to authorise any recommendations made by a pharmacist (Hindi, Schafheutle and Jacobs, 2017). From a qualitative study of GPs and community pharmacists working together to manage patients with chronic diseases, it would appear that if GPs had experience of beneficial contact with community pharmacists previously, their trust and propensity to collaborate in future would be increased (Rieck, 2014).

When patients were asked about which HCP they would use, GPs were mentioned for a variety of different reasons. Focus groups with the general public in Scotland found that patients trust GPs more than pharmacists and this was based on various factors, including; the GP registration and appointment system, the practice environment, and the position of the GP at the top of the primary healthcare hierarchy (Gidman, Ward and McGregor, 2012). When exploring who the general public would use for advice about medicines-related problems, over two thirds of people said they would go to their community pharmacy, but 25% would go to their GP. The reasons for choosing the GP over the pharmacist were because they thought the GP had greater knowledge of them and their health; the pharmacist would not be able to help or have the power to change medicines and; the expectation that the pharmacist would refer them to the GP anyway (Rodgers *et al.*, 2016).

This section shows that even though pharmacists are highly trained HCPs, they are still not perceived to be working at the same level as GPs, and this is evident in the opinions of patients, GPs and also themselves. There is still a long way to go to enlighten some GPs and

patients about the knowledge and skills that community pharmacists possess and the contributions they can make to patient care through the provision of advanced services. In the current study 81.2% of community pharmacists thought that GPs should refer patients to community pharmacists for a MUR. GPs are not really promoting the MUR service to patients so to change these opinions, greater publicity and information about the extended role of community pharmacists should be made available to patients and GPs.

RECOMMENDATION 8

GPs should refer patients for advanced community pharmacy services such as MURs and the NMS. When community pharmacists make recommendations to GPs as a result of these consultations, GPs should inform both patients and pharmacists of the outcome.

9.4 Communication and integration

9.4.1 Communication

9.4.1.1 Communication across the primary-secondary care interface

Effective, timely communication is essential when caring for patients who are making transitions from one care setting to another and this is particularly true when patients leave hospital and return to primary care. Discharge summaries have been sent to GP surgeries electronically since 1 October 2015 (NHS Digital, 2015a), but there are no requirements to send this information to community pharmacists. The community pharmacists in the current study overwhelmingly thought that they should be included in discharge communications, with 89% of respondents thinking they should automatically be sent a copy of the discharge summary and 78.8% preferring to receive it electronically. Community pharmacists in the US have also expressed a wish to receive information electronically at the time of care transitions (Kennelty *et al.*, 2015).

Despite the desire to be party to discharge communications, this is not the case at present; the pharmacists who were interviewed said they often did not know that one of their regular patients had been in hospital and from the questionnaire it was apparent that when they did find out it was often in an impromptu manner with no defined route of communication or flow of information. This was also found in a qualitative study of 14 community pharmacists who reported that they usually found out about an admission during an ad hoc conversation with the patient or their representative, and if they did receive discharge information, it was generally for patients who were seen as complex (Urban *et al.*, 2013).

When patients transition from secondary to primary care, there is inherent risk, particularly around medicines. Of the respondents to the questionnaire in the current study, 68.1% thought that community pharmacists routinely identified issues relating to patient safety. It has been estimated that 1.4% of all medication errors occur when a patient is transferred from once care setting to another, and of these 51.6% have the potential to cause moderate harm and 7.3% the potential to cause severe harm (Elliott *et al.*, 2018). Community pharmacists have been shown to play an important role in identifying medicines-related problems when a patient is discharged from hospital (Braund *et al.*, 2014). In two studies from New Zealand, medicines-related problems were identified commonly. In the first study, 18% of patients (n=401) experienced a medicines-related

problem and 9% (n=840) of prescription items were affected by a clinical medicines-related problem (Maxwell *et al.*, 2013). In the second study, 9% of prescriptions received by community pharmacists from secondary care contained an error of omission or incorrect information (Braund *et al.*, 2014). In a study conducted by community pharmacists in several European countries (excluding the UK), 63.7% of patients experienced a medicines-related problem on discharge from hospital, with the majority related to patient education. Of all medicines-related problems, 24% were due to clinical issues such as interactions or dosing queries (Paulino *et al.*, 2004). A study from the Netherlands that analysed 100 discharge summaries received by a single community pharmacy has also confirmed that the higher the number of medicines prescribed, the greater risk of a medicines-related problem occurring after hospital discharge (Geurts *et al.*, 2013).

Poor communication across the primary-secondary care interface is not a new issue; in fact, there are papers published nearly 30 years ago extolling the need for improved discharge communication between hospitals and GP practices. A study published in the British Medical Journal in 1992 of patients discharged from a hospital in the north-east of England found discrepancies between what medicines the patient should have been taking and what they were actually taking after a hospital discharge. The authors suggested that better communication was required between the hospital and community (Cochrane *et al.*, 1992). A study from Scotland, published in 1997, found that 96% of GPs and 94% of community pharmacists would like information about changes in medication, but that they did not receive them (Munday *et al.*, 1997).

There have been many initiatives over the years that have aimed to solve the problem of poor communication across the primary-secondary care interface and improve patient care during this transition. Involving community pharmacists in quite simple interventions has been shown to have a significant effect on solving medicines-related problems. Nominating a community pharmacy has already been mentioned in section 9.3.1. A RCT that studied 501 patients discharged from one hospital in London found that when patients took a copy of their discharge summary to their community pharmacist, there was a statistically significant reduction in the number of medication discrepancies ($p<0.001$) and discrepancies that had an adverse effect after discharge ($p<0.01$) (Duggan *et al.*, 2011). Other, more recent initiatives have shown community pharmacists to make a significant difference to patient care; this includes the use of PharmOutcomes to send discharge

summaries to community pharmacies in north east England, so patients could have a PD-MUR or a NMS consultation. An evaluation of this system found that those patients who had a follow-up consultation with their community pharmacist had a statistically significant lower rate of readmission, although in the study only 31% of patients referred actually had the community pharmacist's consultation (Nazar *et al.*, 2016). The Refer-to-Pharmacy system that is operational in north west England, is where community pharmacists are automatically sent an electronic copy of the patient's discharge summary, using a specifically designed system, to enable them to support patients post-discharge. It has been estimated that between October 2015 and April 2018, 100 fewer patients have been readmitted to hospital (Randall, 2018). These services comply with the current NICE Medicines Optimisation guidelines which state that when patients move from one care setting to another, 'consideration should be made to sending a person's medicines discharge information to their nominated community pharmacy, when possible and in agreement with the person' (NICE, 2015c). A system similar to PharmOutcomes and Refer-to-Pharmacy is in operation in Wales, where patients are referred to community pharmacists, or patients can present to the pharmacy with a copy of their hospital discharge summary to access a discharge medicines-use review. An evaluation of this system found that during a PD-MUR, community pharmacists identified an average of 1.3 medication discrepancies. It was estimated that the service prevented 1860 readmissions, saving the NHS in Wales £3.9million between October 2011 and December 2013 (Hodson *et al.*, 2014).

Sending discharge information to community pharmacies and referring patients for advanced services is only one factor in the whole process. Studies have highlighted the difficulties community pharmacists face when recruiting patients to participate in the interventions (PD-MUR or NMS) that they have been referred for. Even though patients consent to the sharing of their discharge summaries, once they have been discharged it has proved difficult to engage them in the services available (Nazar *et al.*, 2016; Rutter, Ramsbottom and Fitzpatrick, 2017). This lack of engagement from patients may underpin the fact that in the current study 50% of community pharmacists had not conducted a PD-MUR in the previous month, and of those who had, the actual number was relatively low despite post-discharge patients being on the target list for MURs.

As other authors have said, the ultimate aim of sending discharge summaries to community pharmacists would be to reduce medication-related problems post-discharge and ensure a seamless transition (Urban *et al.*, 2013). A starting point for this would be to make the sending of discharge summaries to community pharmacists mandatory in the first instance.

RECOMMENDATION 9

Patients should nominate a community pharmacy, allowing hospital pharmacy teams to automatically inform them, using enhanced IT systems, when a patient is admitted to, or discharged from hospital. Community pharmacists should automatically receive a copy of the patient's discharge summary when the patient leaves hospital.

9.4.1.2 Access to patients' medical records

Community pharmacists in England currently do not have access to the patient's medical record which is held at the GP surgery; this is despite community pharmacists taking clinical responsibility for the prescriptions they dispense. This lack of information has potential patient safety implications, particularly at the times that patients transfer from one care setting to another. When community pharmacists in the current study were asked whether they routinely identified major safety issues with patients' medicines, more than two thirds (68.1%) agreed that they did. This is in spite of not having the full clinical information about the patient. Likewise, 97.8% of respondents to the questionnaire survey in the current study thought that two-way communication between community pharmacists and GPs was important and 93.8% of respondents thought two-way communication between community and hospital pharmacists was important. The PhIF is prioritising funding to 'evaluate the impact of digital technologies on the healthcare system to improve efficiencies and modernise' (NHS England, 2016b).

In the current study, 55% of respondents said that they thought access to the GPs' medical records was required to enable them to conduct a PD-MUR properly. In the US, the lack of community pharmacists' access to the medical records affected the time it took to conduct a medicines reconciliation after a hospital discharge (Kennelty *et al.*, 2015). Even patients have highlighted that a community pharmacist's lack of access to medical records, and difficulties in communicating with other HCPs would be a barrier to them providing advanced services (Hindi, Schafheutle and Jacobs, 2017).

Since 2017, community pharmacies have been able to access the patient's SCR, which provides a read-only version of a portion of the patient's medical record (PSNC, 2018o).This has proven to be useful but further progress is required.

Some authors have suggested that GPs would not want pharmacists to be given access to medical records, as this might threaten the GP's position at the top of the medical hierarchy (Hindi, Schafheutle and Jacobs, 2017). This opinion appears to have been overridden by the Government, as in 2017 the pharmacy minister gave full support to NHS England's plans to enable community pharmacies to have read and write access to patients' primary care records as soon as possible (Anon, 2018). Furthermore, the RPS is targeting community pharmacists' access to the patient health record as one of their current campaigns with support from the Chair of the All-Party Pharmacy group and the Royal College of GPs amongst others (The Royal Pharmaceutical Society, 2018). It has been acknowledged that this may take time due to constraints, such as differences in IT systems, but this is what the NHS is aiming for (Anon, 2018). According to the PSNC, a pilot project involving pharmacists having 'write' access to the patient's medical record is underway (PSNC, 2018p).

The obvious next step on from this would be read and write access to secondary care medical records from those working in primary care and vice versa. This has been suggested by other authors (Urban *et al.*, 2013), although it would seem to be an aspiration for the future rather than something that could be implemented at the current time.

9.4.1.3 IT solutions

Getting the right IT systems and ensuring that they integrate and are compatible with systems used in other parts of the healthcare system is critical to improving patient care. Community pharmacists having access to discharge summaries and the patient's medical record would be beneficial initially, but the long-term aim should be for a patient record that all HCPs can access and make entries to, irrespective of whether they are in primary or secondary care. In the current study it can be seen that community pharmacists want this, as nearly a third of respondents to the survey wanted discharge summaries to automatically integrate into their PMR. They highlighted their role in identifying major patient safety incidents (although these may not have been specifically due to lack of access to information) and during the interviews, they gave examples of situations where

they had made fortuitous interventions by chance rather than on a more systematic basis with full access to the patient information.

There is some evidence for pharmacy interventions that have relied on electronic means to transfer discharge information to community pharmacies. It is not possible to conclude whether the success of these interventions has been due to the electronic transmission or just the provision of the information, but the results of the following studies provide at least some evidence of improved patient outcomes by providing discharge information electronically to community pharmacists.

One such study has demonstrated how electronic transmission of discharge information to a patient's community pharmacy can have an effect on hospital readmissions. This paper reported the results of a study conducted in north east England that involved the hospital pharmacy identifying patients who they thought would benefit from follow-up with a community pharmacist after their hospital discharge. Patients consented to a referral from the hospital to their usual community pharmacy using the PharmOutcomes system. Of the 2029 patients that started the study, only 619 (30.5%) completed the process and had a consultation with their community pharmacist. The odds of readmission were significantly lower in the group of patients who had a follow-up consultation with their community pharmacist at 30, 60 and 90 days; for example, the odds ratio for readmission at 30 days was 3.1 (95% CI 2.1 – 4.7) (Nazar *et al.*, 2016). Of the referrals made by the hospital, those made to multiples were significantly more likely to be completed than for other types of pharmacy (Nazar *et al.*, 2016).

As already mentioned in section 9.4.1.1, the Refer-to-Pharmacy electronic discharge communication system has been in operation in the north of England since 2015 and automatically transfers a patient's discharge summary to their community pharmacist when they have been discharged from hospital. The aim of the referral is to act as a notifier to the community pharmacist of the hospital admission, but also to trigger them to consider a NMS or PD-MUR for the patient. All patients who consent are referred and there is no attempt to identify and target patients at high-risk of a readmission. A qualitative study with the pharmacy staff from primary and secondary care who were involved with the service found that since the service has been introduced community pharmacists

reported they had improved communication with GPs. The pharmacists also felt that the service reduced the risk of error and saved time (Ferguson, Seston and Ashcroft, 2018).

Enhanced IT capabilities should be pursued by the all sectors of the NHS; in 2016 Parliament issued a briefing that said by 2020, NHS England intended to connect electronic health records across primary, secondary and social care. It also acknowledged that there were 'a range of technological and organisational challenges to implementation such as interoperability, staff training and maintaining the privacy of patient data' (House of Parliament - Parliamentary Office of Science and Technology, 2016). With less than two years until 2020, this seems a somewhat aspirational aim but one that still should be encouraged.

RECOMMENDATION 10

Community pharmacists should have 'read and write' access to patients' medical records.

9.4.2 Integration

9.4.2.1 Community pharmacists' integration into the primary care team

Community pharmacists are part of the primary care healthcare team but do not always feel that way. As previously mentioned, cohorts of both patients and GPs think of them as purely suppliers of medicines and do not appear to value the training and unique skills they possess. Pharmacists have been singled-out as a profession that should be better utilised by the NHS to improve patient care, through the use of their knowledge and expertise. This strategy, alongside innovations in IT, should be exploited for the benefit of patients. Figure 9-6 illustrates how community pharmacists could be better integrated into the primary care team and summarises how the different sectors should be linked, with facilitation from enhanced and improved IT systems allowing the free flow of information.

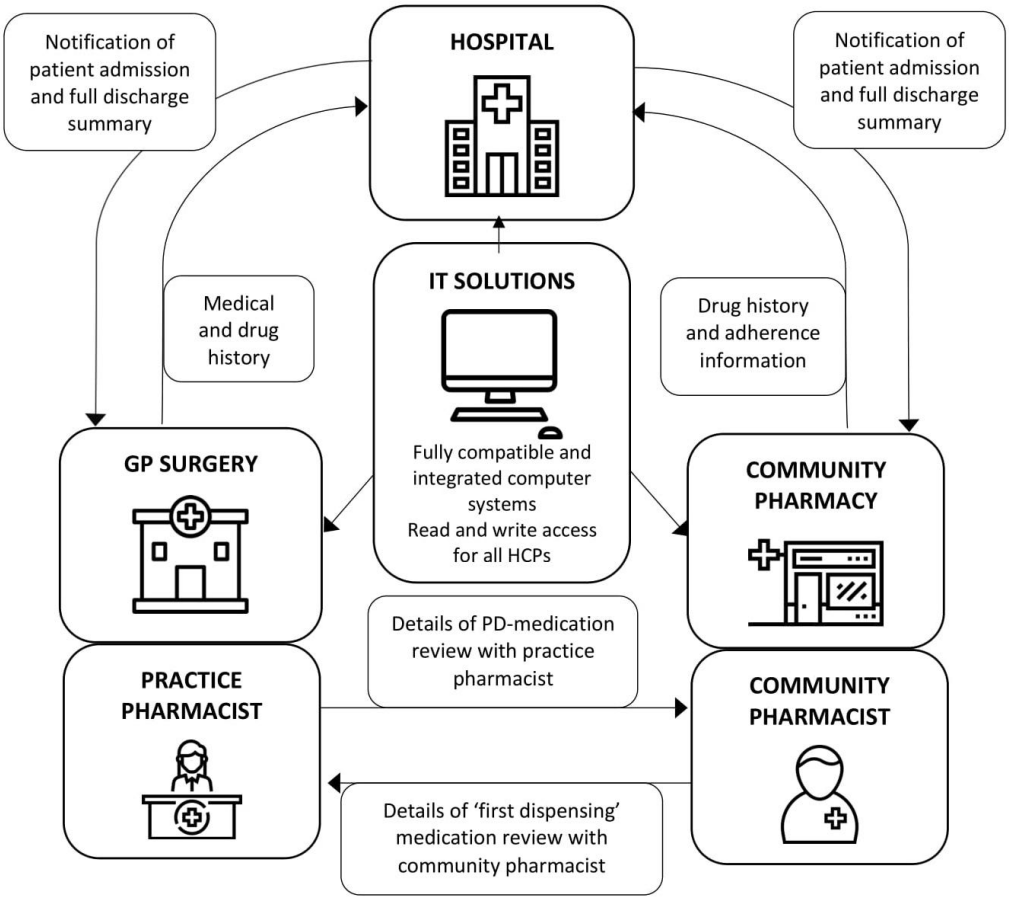


Figure 9-6 Integration of community pharmacists into the primary care team

A study that sought the opinions of community pharmacists, GPs and practice nurses about who they viewed as being a member of their multi-disciplinary team (MDT) found that 78% of community pharmacists considered themselves to be part of the MDT. This was compared to 99% of GPs and 98% of practice nurses who felt they were part of the MDT. When GPs and nurses were asked whether they considered community pharmacists to be part of their MDT, 56% of GPs and 57% of practices nurses thought they were. This was mainly due to GPs and nurses having little contact with community pharmacists and some viewed them as being situated outside the NHS or being business-focussed (Weiss *et al.*, 2018).

In the current study, the community pharmacists who were interviewed wanted to be more integrated into the primary care team. From the survey, community pharmacists working in rural areas thought they were best suited to providing PD-MURs. It could be postulated that this was because they felt more integrated and had better relationships

with other members of the primary care team compared to pharmacists working in urban areas. It was also shown in the study from Germany that community pharmacists working in rural areas had more positive interactions with GPs than those working in urban areas. This was attributed to long-lasting working relationships based on trust and mutual esteem. In contrast, pharmacists working in urban areas often did not know the GPs they were speaking to (Löffler *et al.*, 2017).

Patients appear to be confused about how the services offered by community pharmacists 'fit' into their journey through the NHS, and this confusion over care pathways also needs to be addressed. Although encouragingly, in the current study nearly three-quarters (73.8%) of the community pharmacists surveyed thought that patients were willing to discuss post-discharge medication-related issues with them. In some studies, despite confidence in the community pharmacists' skills and an initial boost in their professional profile, there were still reservations about how the services they provided fitted into the overall primary care offering. In one study patients reported that community pharmacists were skilled healthcare professionals with the ability to provide medicines-related information, but there was confusion about how the services they provided integrated with those provided by the GP (Hall, Donovan and Wilkes, 2018). A study published in 2008, three years after the introduction of MURs, found that community pharmacists in the north of England providing the MUR service felt their profile had been raised in the eyes of patients and patients were more confident in them since the introduction of MURs (Urban, Rivers and Morgan, 2008). From the patient's point of view, it appears that even after more than a decade of community pharmacists providing MURs, still more work is required to establish the place of pharmacists and MURs in practice. It seems that these early indications of a change in perception of community pharmacists may not have come to fruition.

The NHS Five Year Forward View, published in 2014, set out the vision of the future of the NHS in England. This was based on the key assumptions that the NHS should continue to be funded by taxation, free at the point of use and able to meet the needs of the population (NHS England, 2014). One of the overarching aims was that the NHS should focus on providing high quality services to fulfil the needs of patients; this must be done against a background of efficiency savings and increasing demands on NHS services year-on-year. Several different ways of achieving this aim were suggested, including more integrated

systems that bridged primary and secondary care and more innovative ways of working (NHS England, 2014; The Royal Phamaceutical Society, 2014).

The RPS briefed pharmacists and encouraged them to get involved in these new care models, engage with the NHS sustainability and transformation plans (that were a requirement of the Five Year Forward View) and take advantage of these new opportunities in primary care (The Royal Phamaceutical Society, 2014). Community Pharmacy organisations responded to the Five Year Forward View with a report called Community Pharmacy Forward View which suggested that:

> 'Pharmacies should be operating as part of integrated primary care networks; their staff meeting regularly with GP practice teams to align and monitor their approach to medicines optimisation.'
>
> (Pharmacy Voice, 2016)

Health Education England is also working with NHS England to ensure that the pharmacy workforce is able to provide these new integrated services in the future. Pharmacists and pharmacy technicians need to have the clinical skills to provide high-quality patient care as part of the multi-disciplinary primary care team (Health Education England, 2018a).

A systematic review looking at collaboration between GPs and pharmacists and implementation of suggestions following medication reviews found that the better the GP-pharmacist relationship, the more interventions that were effected (Kwint *et al.*, 2013). Other authors have suggested facilitators for effective medication reviews, such as an established relationship between the pharmacist and GP and having meetings in person to discuss the outcomes of the medication reviews (Kwint *et al.*, 2013). A systematic review and qualitative study with the general public has also found that if GPs demonstrate their confidence in pharmacists' skills and endorse the advanced services they provide, patients trust in them would be increased and they would partake in their services more frequently (Gidman, Ward and McGregor, 2012; Hindi, Schafheutle and Jacobs, 2017).

Some authors have suggested that by extending the role of the community pharmacist there will be a variety of benefits such as reducing the burden on GPs, increasing the professional profile of community pharmacists, improving patient outcomes and increasing patient satisfaction (Hall, Donovan and Wilkes, 2018). Community pharmacists need to capitalise on these opportunities and the result will be better satisfaction with their role,

greater acceptance by patents and GPs and therefore enhanced integration into the primary care team. Recommendation 8 has already highlighted the necessity for good teamwork from all members of the primary care team.

9.4.2.2 Practice pharmacists

In the current study of community pharmacists, 57.3% of respondents thought that the HCP best suited to conducting a post-discharge review of a patient's medicines was either a pharmacist specifically employed to care for patients during their transfer of care or a practice pharmacist. Only 24.5% of respondents thought that community pharmacists were best placed for that task. Community pharmacists feel that they do have the expertise to conduct PD-MURs but the difficulties of providing the service, such as lack of time, problems identifying patients and the flat rate of remuneration, hamper these efforts. Practice pharmacists are in a better position to provide post-discharge medication reviews due to their location, use of an appointment system, access to information and the ability to update prescriptions.

The increase in GP surgeries having pharmacists as part of their core team stems from a pilot scheme announced in 2015 to encourage GP practices to employ clinical pharmacists by providing £15 million of funding (NHS England, 2015b). By November 2015 this funding was doubled to £31 million due to the demand from GP surgeries (Torjesen, 2015). The General Practice Forward View report, published in 2016, suggested several ways to address the workload issues facing GPs. The report stated that:

> 'Pharmacists remain one of the most underutilised professional resources in the system and we must bring their considerable skills in to play more fully.'
>
> (NHS England, 2016a)

By 2020/2021 there will be an extra 1500 pharmacists working in general practice due to £100 million funding announced in 2016 after the successful pilot (Kmietowicz, 2016). An analysis of the effectiveness of pharmacists working in GP practices was published in 2018; it noted that there was better collaboration between pharmacists and GPs when they worked in the same location and the pharmacist had access to the patient's medical record. To ensure that pharmacists were integrated into the primary care team, they needed to be 'visible, communicate well and be flexible and innovative' as well as adaptable to the practice environment they found themselves working in (Mann *et al.*,

2018). After the pilot period is completed, GP surgeries or clusters of surgeries will be required to fund these clinical pharmacist posts themselves (NHS England, 2015a).

The involvement of practice pharmacists in caring for patients after hospital discharge and conducting medication reviews for them, is endorsed by the RPS as one of the key medicines optimisation functions of pharmacists working in GP surgeries (The Royal Pharmaceutical Society, 2014; The Royal Phamaceutical Society, 2016). Furthermore, the evaluation of pharmacists working in GP practices in England found that 63% of practice pharmacists were involved in post-discharge medicines reconciliation on a daily basis and 21% involved several times a week (Mann *et al.*, 2018).

There is good evidence that pharmacists working in GP surgeries can have an impact on patient care. A systematic review and meta-analysis of pharmacist services provided in general practice clinics found that the majority of studies included interventions that involved medication review by pharmacists, either face-to-face or using the patient's records. The meta-analysis showed that interventions delivered by the pharmacists resulted in statistically significant improvements in blood pressure, glycosylated haemoglobin, cholesterol and Framingham risk score. The authors stated that the review showed the benefit of pharmacists working in the same location as GPs. Medication reviews were more effective when they were followed by a face-to-face discussion between the pharmacist and GP and even more benefit was seen if the pharmacist also offered additional services such as providing adherence assessments, lifestyle advice or adjusting medications for the patient. There was no evidence for any effect on 'hard outcomes' such as morbidity or mortality (Tan *et al.*, 2014). And some GPs appear to like having pharmacists available to provide input to patient care; a recently published study of pharmacists providing medication reviews in the GP surgery or patient's homes in Iceland found that once GPs had experience of where pharmacists could add value to patient care, they wanted access to their skills on a daily basis (Blondal, Sporrong and Almarsdottir, 2017).

Practice-based pharmacists or pharmacists specifically involved when patients transfer from one setting to another could also look to IMM programmes for evidence of the efficacy of pharmacists during transfer of care. An evaluation of an IMM programme in London offering personalised pharmaceutical care, working across boundaries and

including post-discharge follow-up found a statistically significant reduction in preventable medicines-related readmissions to hospital, with only two out of 744 patients who participated in the intervention being admitted to hospital with a preventable medicines-related readmission. For every £1 spent on running the scheme, £3 was saved by the health economy (Barnett *et al.*, 2016). In Northern Ireland, a scheme which involved the free flow of information between hospital doctors, hospital pharmacists, GPs and community pharmacists (the discharge summary was posted to the GP and the community pharmacist), found that the intervention reduced the length of stay by 5.86 days if patients were readmitted ($p=0.013$). The study also showed that the number of readmissions was reduced and the time from the first admission to a readmission was lengthened, although these results were not statistically significant (Scullin *et al.*, 2011). IMM schemes have also been shown to be effective in other countries such as Sweden, Norway and the Netherlands (Barnett, 2016).

The findings of the current study suggest that practice pharmacists should complete an initial medication review and medicines reconciliation with the patient when they have been discharged from hospital. This should ideally be completed with the patient at the GP surgery. This does not mean that community pharmacists should not be involved in medication review for patients after a hospital discharge; in fact, there is plenty of scope for their input. After a practice pharmacist has conducted a post-discharge medication review and updated the patient's prescription template on the practice computer system, the details of this consultation should be available to all members of the primary care team, including the community pharmacist. The community pharmacist can ensure the patient collects the correct medicines for their first dispensing after discharge and continue the education and support of the patient with their new medication regime. This could be in the form of a FD-MUR. Ideally, this scenario should involve two-way communication between the GP surgery and community pharmacy, read and write access to the patient's clinical record and endorsement of the service from the GP team. The evaluation of clinical pharmacists working in GP surgeries in England found evidence that they could work with community pharmacists and increase their collaboration through the use of examples of good practice and innovation (Mann *et al.*, 2018).

There are several advantages to the practice pharmacist conducting this initial medication review with post-discharge patients. They have access to the information required, are able

to adjust the clinical record, can provide the service within the GP surgery, can update the repeat medicines template and they operate using an appointment-based system which not only allocates time for these processes but also seems to give more authority to the pharmacist conducting the review. One systematic review found that it took community pharmacists on average 45 minutes to complete a medicines reconciliation for a patient who had been discharged from hospital (Geurts *et al.*, 2013); this would prove difficult to deliver in a busy community pharmacy, especially if only one pharmacist was available.

As noted previously in this chapter, for some patients getting to the GP surgery after their hospital discharge may be difficult, so a domiciliary visit from the practice pharmacist would overcome this potential barrier. Within the current framework for providing MURs there is limited scope for community pharmacists to provide a domiciliary service as it requires specific agreement from NHS England (PSNC, 2018c), but practice pharmacists do not have the same constraints.

The views of patients towards having a consultation with the pharmacist must also be considered. In the current study there were definite reservations from patients in engaging with a service from a community pharmacist, including how this would impact on the relationship with their GP. A qualitative synthesis of studies that explored the role of community pharmacists found that patients did not want to harm their relationship with their GP and this made them apprehensive about engaging in an advanced service with a community pharmacist without endorsement from the GP (Hall, Donovan and Wilkes, 2018). From the patients' point-of-view, the co-location of practice-based pharmacists in the GP surgery may provide an unconscious endorsement of the service by the GP. This gives the practice pharmacist an opportunity to provide these services to patients who would not attend a community pharmacy for a MUR or PD-MUR. Also, the ability of practice pharmacists to conduct domiciliary visits as discussed in section 9.3.1.3 is an added advantage.

Medication review and medicines reconciliation are vitally important for patients after a hospital discharge. The findings of the current study suggest that pharmacists have the unique skills to conduct these tasks and embedding them into the package of 'standard care' for patients who have been in hospital would benefit not only patients but also GPs and the whole healthcare system.

9.4.2.3 The next steps to integration: The 'hybrid' pharmacist

Pharmacists in the current study were prepared to use opportunities to work in different ways to improve patient care. One such transformation would be in the way that pharmacists care for patients in the community and support them to use their medicines most effectively. Community and practice pharmacists are equally important for the future of the NHS in the provision of medicines-related expertise, but there are geographical, professional and other barriers that currently exist. These could be overcome to some extent, through a novel model of pharmaceutical care provided by a 'hybrid' pharmacist.

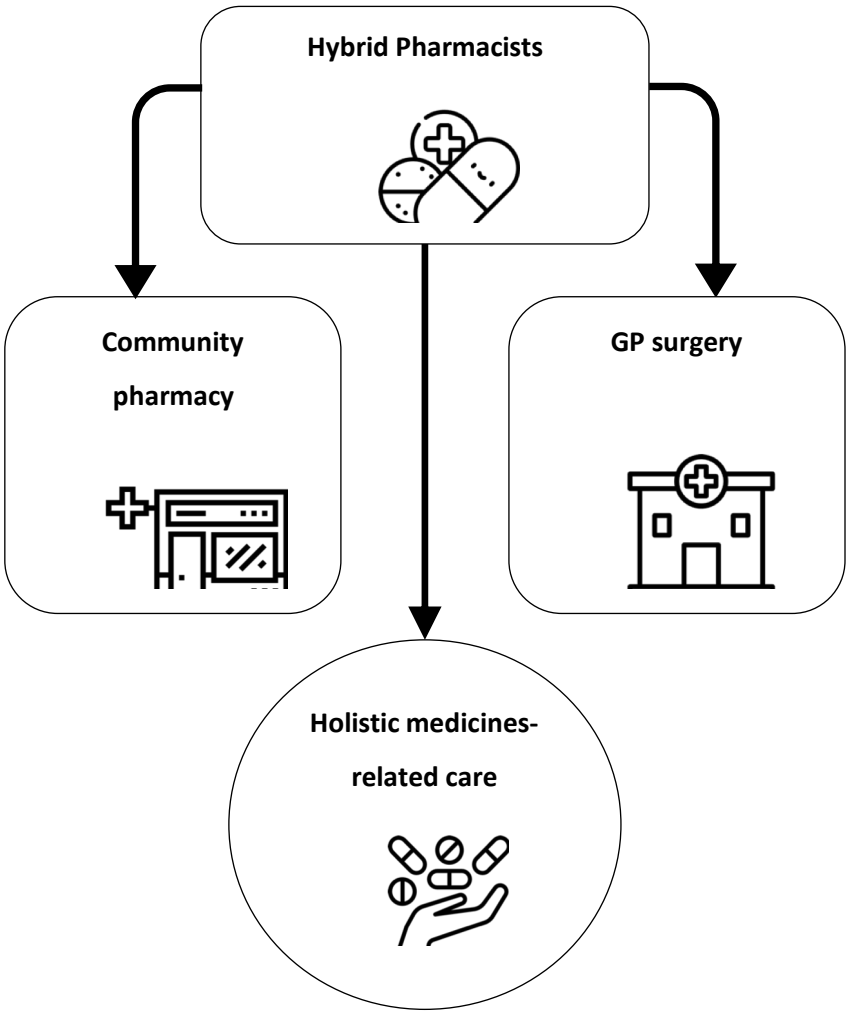


Figure 9-7 The Hybrid Pharmacist Model

The hybrid pharmacist's role would encompass tasks that have been traditionally provided by community pharmacists and more recently by practice pharmacists. It would be anticipated that pharmacists working in a hybrid role would work across the GP-community pharmacy boundary by spending time in each location caring for a group of patients who require more intensive support with their medicines. In reality this cohort of patients are likely to be older, have one or more long-term conditions and would be dealing with complex medication regimes, or a combination of these factors. The hybrid pharmacist would provide medicines expertise and continuity of care to ensure that this group of patients received personalised care, tailored to their needs and delivered by the same person at both the GP surgery and community pharmacy. To facilitate this model, commissioning and funding would need to be revised to focus on individualised, holistic care tailored to the needs of these high-risk patients. The emphasis would need to be on

how hybrid pharmacists would benefit patients, rather than concentrating on the more traditional pharmacy functions of supplying medicines or medication review.

Pharmacists working in hybrid roles could work on specific days in the GP surgery or surgeries, and community pharmacy. They would have a case-load of patients to care for who they would see on an appointment basis in the GP surgery and then oversee the supplies of their medicines in the community pharmacy. The patients would also be able to access their advice and support outside of these set times, with the aim of facilitating joined-up care for the patient in the primary care environment. The hybrid pharmacist would have access to the patients' records at both the GP surgery and community pharmacy and have the ability to write in these records as necessary. Importantly, hybrid pharmacists would be independent prescribers which would allow them not only to update the prescriptions in the GP surgery but also to adjust patients' medication regimes as required to gain the best health outcomes for the patients they care for. Their role would be supported by the GP who would coordinate patients' care with the hybrid pharmacist. Pharmacists working in hybrid roles would most likely have already been working with the GP practice as a practice, CCG or community pharmacist and have built a good working relationships with other HCPs in the locality, rather than someone completely new to that particular primary care team. The roles and responsibilities of hybrid pharmacists may grow organically and differ between localities based on the patient population and needs of the patients. Pharmacists who had completed their pre-registration training in cross-sector placements that included community pharmacies and GP surgeries would be ideally placed to work in these roles. The overall aim of this model would be to reduce medicines-related problems, particularly medicines-related hospital admissions. This model would require a funded pilot to establish how it could work in practice.

This concludes the discussion of the findings. Figure 9-8 shows the main themes of the discussion and the interlinked relationships between them. It highlights the current and potential scenarios for pharmacists working in community pharmacy/primary care.

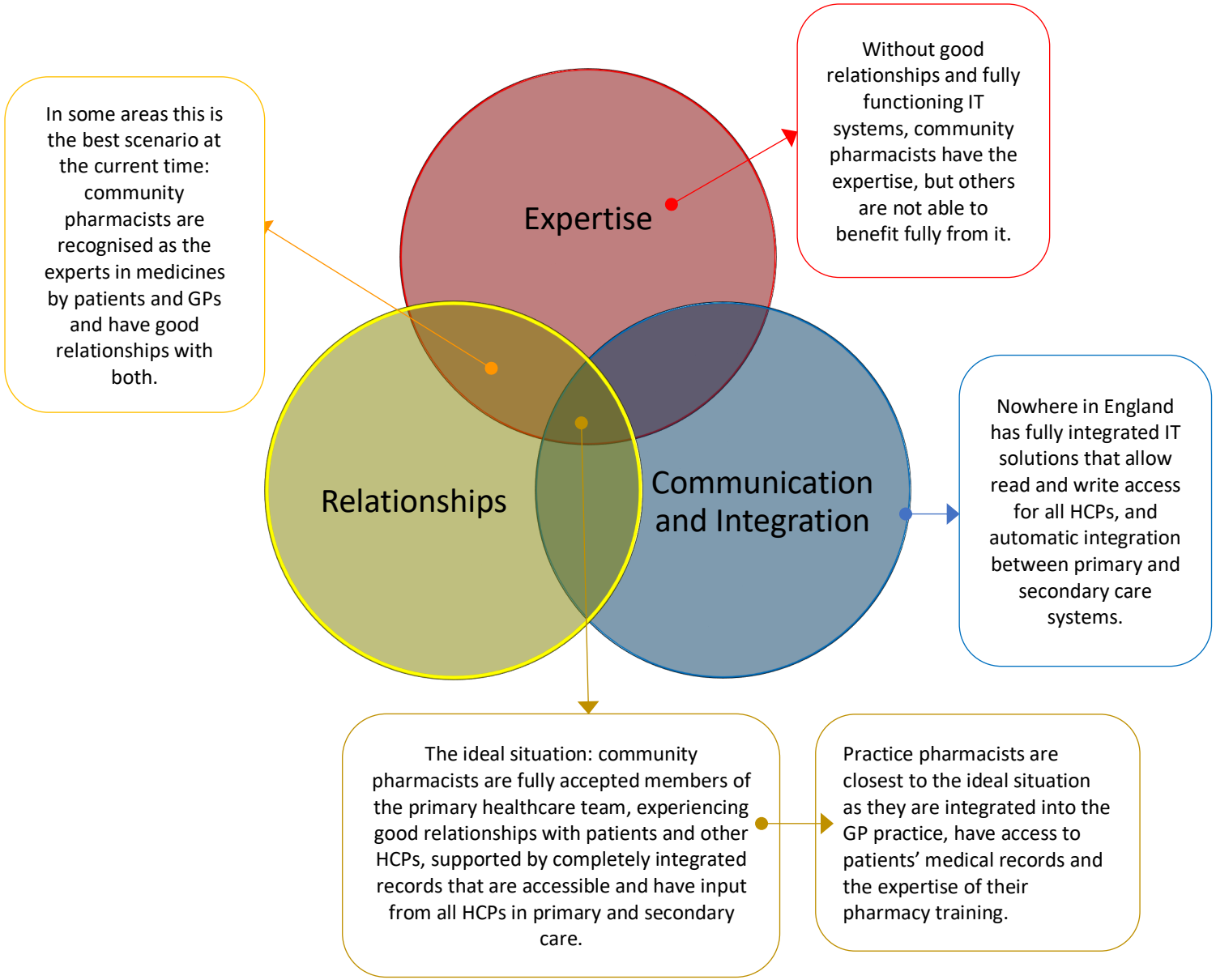


Figure 9-8 Interrelationships between themes

9.5 Strengths and Limitations

The strengths and limitations of each phase of the study have already been discussed in previous sections; section 5.5 for the HES data study, 6.4 for the patient interviews, 7.5 for the pharmacist interviews and 8.9 for the pharmacist survey. They have not been restated here, but the strengths and limitations of the study as a whole are included in this section.

The rationale for choosing mixed methods has already been presented in section 4.2.2.1 and this study has exploited the benefits of using both qualitative and quantitative techniques. The use of the sequential exploratory strategy meant that the results of the qualitative phases of the study were used to guide and develop the quantitative tool, ensuring that the questions asked were relevant to both the population and topic being studied. This ensured that the study was always rooted in the attitudes and experiences of the people involved, rather than relying on the prior knowledge or assumptions of the PI. If the questionnaire had been designed without the initial qualitative phase, it would not have asked the right questions to gain a full understanding of the experiences of the patients and pharmacists involved. The qualitative interviews allowed the quantitative data from the survey to be contextualised which gave them greater meaning and enabled more robust recommendations to be made.

The results of the various phases of the study enabled triangulation of the findings. From the patient interviews, pharmacist interviews and survey, the themes of relationships, expertise, and communication and integration were all present. Patients and community pharmacists talked about these aspects from different perspectives, but the assimilation and integration of these findings strengthened the rationale for the recommendations.

This study used novel approaches that do not appear to have been previously described in the published literature. One distinctive factor that underpinned the whole research study was the use of the patients' experiences as the driver for the study. This was to ensure that patients were at the heart of the research and guaranteed that their voice was heard. Indeed, it is becoming more common for quantitative studies focussed on patient outcomes to include qualitative techniques to also research patients' experiences (Liabo *et al.*, 2018). The use of IPA as the method of analysing the patient interviews, again enshrined the patient and their experiences at the heart of the study. Finally, the use of factor analysis to discern the attitudes of community pharmacists towards their role in

supporting patients and analysing the responses according to their personal and demographic characteristics.

The limitations of mixed methods research generally occur during the planning and fieldwork stages. Mixed methods studies tend to be more time consuming and complex to conduct due to the collection and analyses of two types of data. This was true for this study; considerable time and effort was required not only for the planning and execution of the fieldwork but also for the thought required to present and discuss each phase of the study and then interpret and contextualise the findings as a whole.

9.6 Areas for future research

The discussion chapter has already drawn attention to several areas where future research should focus. These are listed here for clarity.

- A RCT is required with multiple arms to compare the outcomes for patients who receive various levels of pharmaceutical support from pharmacists in different settings after hospital discharge. This RCT should compare outcomes such as hospital readmission rates, medicines-related ADRs, morbidity and mortality. Patients should be allocated to various groups including standard care; medicines reconciliation and medication review with a practice pharmacist followed by a FD-MUR with a community pharmacist; a PD-MUR from a community pharmacist alone or a medication review by a practice-based pharmacist alone. This study would need to recruit several thousand patients to gain sufficient outcome data to show which model of care is most effective. An economic evaluation should also be conducted alongside the RCT to ascertain which model is most cost-effective.
- The role of hybrid pharmacists working in GP surgeries and community pharmacies could be explored further through a commissioned pilot study and evaluation. The aim would be to establish whether providing co-ordinated care in this manner would benefit specific groups of patients who require additional support to manage their medicines.
- A trial of alternative funding for post-discharge medicines support is required to ascertain whether a QOF-type arrangement for practice and community pharmacists would work in practice.

- An evaluation of post-graduate interprofessional learning and collaborative working is required to determine best practice for HCPs and beneficial outcomes for patients.

9.7 Summary of the Discussion chapter

This chapter has brought the findings of the various stages of the fieldwork together and presented them in the context of the published literature. The findings from all phases of the current study have been discussed under the themes of: expertise, relationships and, communication and integration. Figure 9-8 showed the interlinked nature of these themes, the position of HCPs working in the NHS in England at the current time, and where the NHS should be aiming in the future.

Chapter 10 will state the recommendations of the study and draw the thesis to a close.

10 Conclusions and Recommendations

Chapter Overview

This chapter will present the conclusions and recommendations of the study.

10.1 Conclusions

This multi-phase study has explored the knowledge and attitudes of patients and community pharmacists about post-discharge medicines support, focussing especially on medication reviews. The findings have demonstrated an imperfect service with the potential for improvements that would benefit not only patients but also the pharmacists that care for them.

For patients, their locus of control, level of health literacy and other more practical issues, such as their mobility, affect whether they access the services provided by their community pharmacist. Patients need to be educated about the provision of advanced services that are available from community pharmacies after hospital discharge. The remuneration and target-based MUR quota system should be revised so that community pharmacists are rewarded differently; perhaps in a similar manner to GPs working within the QOF system, thus acknowledging their level of expertise.

There are also community pharmacist specific factors that affect their willingness to engage all patients in advanced services. It is imperative that the hospital discharge process includes community pharmacists and their contribution is embedded in the system. This could happen in a number of ways and would provide a clear signal to patients that community pharmacists are integral to patient support and safety at the time of hospital discharge.

IT solutions are vital to enable community pharmacists to become more involved in post-discharge patient care. The ability of community pharmacists to access the patient's medical record and discharge information is imperative to the NHS exploiting the unique skills of community pharmacists.

Recommendations have been made, based on the findings of the current study. These can be used by pharmacy organisations, representative bodies, policy-makers and the NHS to promote and encourage the use of pharmacists and their unique skills to benefit patients in the post-discharge period.

10.2 Recommendations

The rationale for the recommendations of the research have been presented in Chapter 9. They are presented here as a numbered list for clarity.

1. A practice pharmacist should conduct medicines reconciliation and medication review, in the practice or at the patient's home, as soon as possible after hospital discharge. Details of the review should be shared electronically with the patient's community pharmacist. Patients should have a 'first-dispensing' MUR conducted by a community pharmacist, to check their use and understanding of their medicines when they collect their first prescription after they have been discharged from hospital.
2. Community pharmacists should use their specialised knowledge of high-risk medicines, information about whether their patient has recently been in hospital and an awareness of those who experience the greatest burden of medicine-taking to prioritise patients for MURs. This should be facilitated by currently available IT solutions, and in the future, should be fully integrated across different healthcare providers.
3. Community pharmacists should access the Pharmacy Integration Fund to finance formal and informal training, to increase their skills in caring for post-discharge patients. The Fund should also be used to promote innovative ways of working, by commissioning direct services from pharmacists such as first-dispensing MURs or developing IT solutions to facilitate the integration of pharmacy and GP IT systems.
4. Remuneration for post-discharge medication reviews and support by community or practice pharmacists should be based on the proportion of discharged patients (on four or more medicines) who have their medicines reconciled and, are offered further advice and support with their medicines. This should be done in a similar manner to the GP QOF system.
5. Community pharmacists should use the guidance contained in the NICE clinical guideline on medicines adherence (NICE, 2009) to engage with patients to determine the amount, depth and level of information they need according to their health beliefs

and level of health literacy. This would empower patients to gain the most benefit from their medicines.

6. The role and skills of community pharmacists should be promoted to patients through advertising, word of mouth, endorsement from other HCPs and commissioning of novel services, such as first-dispensing MURs. Community pharmacists should be seen as the first 'port of call' for patients who require assistance with any aspect of managing their medicines.
7. The role and skills of community pharmacists should be promoted to GPs, facilitated by regular, personal contact. This should be achieved through the commissioning of pilot programmes focussed on medicines-related issues and interprofessional learning. Representative organisations, such as the RPS and BMA, should jointly publicise successful pilots to their members to aid in the dissemination of best practice.
8. GPs should refer patients for advanced community pharmacy services such as MURs and the NMS. When community pharmacists make recommendations to GPs as a result of these consultations, GPs should inform both patients and pharmacists of the outcome.
9. Patients should nominate a community pharmacy, allowing hospital pharmacy teams to automatically inform them, using enhanced IT systems, when a patient is admitted to, or discharged from hospital. Community pharmacists should automatically receive a copy of the patient's discharge summary when the patient leaves hospital.
10. Community pharmacists should have 'read and write' access to patients' medical records.

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12 Appendix A – Search strategies for literature review

12.1 Literature searches for medicines-related hospital admissions

The search terms detailed in Table 12-1 were used to find published papers that focussed on medicines-related hospital admissions. The search was carried out in Medline (1946 – March 2013), Embase (1980 – March 2013) and CINAHL (1981 – March 2013) with email updates when new papers were published that fulfilled the search criteria. The abstracts of the papers were reviewed and the full text of papers of interest obtained. The reference lists of useful papers were also searched for further relevant literature.

Table 12-1- Search terms used to find published papers focussing on medicines-related hospital admissions

1	("drug induced" OR "drug related").ti,ab
2	("medic* induced" OR "medic* related").ti,ab
3	iatrogenic.ti,ab
4	“adverse event”.ti,ab
5	1 OR 2 OR 3 OR 4
6	(readmission* OR rehospitali*).ti,ab
7	5 AND 6

af = all fields; ti = title; ab = abstract

12.2 Literature searches for medication review

The search terms detailed in Table 12-2 were used in the systematic review by Geurts *et al.*, (2012) and were used in the current study to search both Medline (1946 – November 2013) and Embase (1980 – November 2013) with email updates when new papers were published that fulfilled the search criteria. The abstracts of the papers were reviewed and the full text of papers of interest obtained. The reference lists of useful papers were also searched for further relevant literature.

Table 12-2 - Search terms used to find published papers focussing on medication review

1	PHARMACISTS
2	PHARMACEUTICAL SERVICES
3	“pharmaceutical care”.af
4	“pharmaceutical service*”.af
5	pharmacists.af
6	pharmacist.af
7	“pharmaceutical practice*”.af
8	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7
9	PHYSICIANS, FAMILY/
10	FAMILY PRACTICE/
11	“family practice”.ti,ab
12	“general practice”.ti,ab
13	“general practitioner”.ti,ab
14	“family practitioner”.ti,ab
15	9 OR 10 OR 11 OR 12 OR 13 OR 14
16	PATIENT CARE/
17	INTERPROFESSIONAL RELATIONS/
18	cooperation.af
19	REFERRAL AND CONSULTATION/
20	consultation.af
21	“patient care”.af
22	review*.ti,ab
23	16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22
24	(medical AND record*).ti,ab
25	(prescription AND record*).ti,ab
26	“pharmaceutical care”.ti,ab
27	medication.ti,ab
28	24 OR 25 OR 26 OR 27
29	8 AND 15 AND 23 AND 28

af = all fields; ti = title; ab = abstract

13 Appendix B – Ethical approvals

13.1 University of Bath Sponsorship approval

Professor Jane Millar OBE FBA FAcSS
Pro-Vice-Chancellor Research

Vice-Chancellor's Office
Bath BA2 7AY
Tel: 01225 386141
Email: Pro-vc-research@bath.ac.uk

Jenny Veeren
Department of Pharmacy & Pharmacology

30 April 2015

Dear Jenny

Medicines related hospital admissions and medication reviews: patient and pharmacist perspectives

I am pleased to confirm that the University is prepared to act as a sponsor under the Department of Health's Research Governance for Health and Social Care (2005) subject to the following:

1. The University requires you, as the Principal Investigator, to conduct the study in compliance with the requirements of the Framework so it is able to meet its obligations as sponsor. The requirements are:
    - Developing proposals that are scientifically sound and ethical.
    - Submitting the design for independent expert review.
    - Submitting the study (or proposal) for independent ethical review.
    - Conducting a study to the agreed protocol (or proposal), in accordance with legal requirements, guidance and accepted standards of good practice.
    - Preparing and providing information for participants.
    - Ensuring participants' welfare while in the study.
    - Arranging to make findings and data accessible following expert review.
    - Feeding back results of research to participants.
2. University professional indemnity and insurance will apply to the study as appropriate, within the UK.
3. As the Principal Investigator/Chief Investigator for the study, the University requires you to comply with the University policy on research data and all systems of good practice.
4. Substantial amendments and reports should be submitted to the sponsor.
5. An end of study report should be submitted to the sponsor using the final report form available here: http://www.bath.ac.uk/ris/developing-a-proposal.bho/submitting/applying-for-sponsorship-in-the-NHS/index.html
6. Any SAEs (serious adverse events) and any other incidents should be reported to the sponsor within 24 hours on the appropriate form available here: http://www.bath.ac.uk/ris/developing-a-proposal.bho/submitting/applying-for-sponsorship-in-the-NHS/index.html
7. Please note that this study could be subject to monitoring as part of our obligations as research sponsors. You will be informed separately if this is the case.

Yours sincerely

Jane Millar

Professor Jane Millar
Pro-Vice-Chancellor

13.2 NRES approval

NRES Committee East Midlands - Nottingham 2
Royal Standard Place
Nottingham
NG1 6FS

Telephone: 0115 8839437

11 June 2015

Ms Jennifer Veeren
Pharmacy Department, Gloucestershire Royal Hospital
Great Western Road
GLOUCESTER
GL1 3NN

Dear Ms Veeren

Study title:	**Medicines related hospital admissions and medication reviews: patient and pharmacist perspectives**
REC reference:	**15/EM/0239**
IRAS project ID:	**177528**

Thank you for your letter of 9th June 2015, responding to the Proportionate Review Sub-Committee's request for changes to the documentation for the above study.

The revised documentation has been reviewed and approved by the sub-committee.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact the REC Manager Mrs Carolyn Halliwell, NRESCommittee.EastMidlands-Nottingham2@nhs.net. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations.

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from NRES. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" above).

Approved documents

The documents reviewed and approved by the Committee are:

Document	*Version*	*Date*
Covering letter on headed paper [Covering letter]	Version 1	07 May 2015
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [University of Bath insurance document]	Version 1	01 August 2014
Interview schedules or topic guides for participants [In-patient interview topic guide]	Version 1	09 January 2015
Interview schedules or topic guides for participants [Out-patient interview topic guide]	Version 1	09 January 2015
Interview schedules or topic guides for participants [Pharmacist interview topic guide]	Version 1	13 January 2015
IRAS Checklist XML [Checklist_11052015]		11 May 2015
Letter from sponsor [University of Bath sponsor letter]	Version 1	30 April 2015
Non-validated questionnaire [Draft questionnaire]	Version 1	02 February 2015
Other [Covering letter on headed paper]		09 June 2015
Participant consent form [Consent form for pharmacist interviews]	Version 1	09 December 2014
Participant consent form [Consent form for patient interviews]	Version 1.2	03 June 2015
Participant information sheet (PIS) [Information sheet for pharmacist interviews]	Version 1	13 December 2014
Participant information sheet (PIS) [Information sheet for patient interviews]	Version 1.2	03 June 2015
REC Application Form [REC_Form_11052015]		11 May 2015
Research protocol or project proposal [Protocol]	Version 1.2	07 June 2015
Summary CV for Chief Investigator (CI) [Chief Investigator CV]	Version 1	23 April 2015
Summary CV for supervisor (student research) [Supervisor CV]	Version 1	29 April 2015
Summary, synopsis or diagram (flowchart) of protocol in non technical language [Lay summary]	Version 1	09 March 2015

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document “After ethical review – guidance for researchers” gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of

changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:
http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

15/EM/0239	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project.

Yours sincerely

pp C Hallwell

Dr Ian Ross
Vice Chair

Email: NRESCommittee.EastMidlands-Nottingham2@nhs.net

Enclosures: *"After ethical review – guidance for researchers"*

Copy to: *Professor Jane Millar*

Mr Mark Walker, Gloucestershire R&D Consortium

13.3 NHS R&D approval

Gloucestershire Hospitals NHS
NHS Foundation Trust
% **Gloucestershire Research Support Service**
Leadon House
Gloucestershire Royal Hospital
Great Western Road
Gloucester
GL1 3NN
Telephone: 0300 4225463
Facsimile: 0300 4225469
Email: mark.walker@glos.nhs.uk

Our R&D ref: 15/003/MTS

Wednesday, 01 July 2015

Ms. Jennifer Veeren
Clinical Pharmacist
Pharmacy Department
Gloucestershire Royal Hospital
Great Western Road
Gloucester, GL1 3NN

Dear Jennifer

Study title: **Medicines related hospital admissions and medication reviews: patient and pharmacist perspectives**
REC REF: **15/EM/0239**

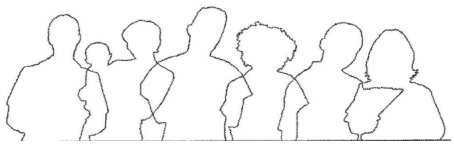
Thank you for forwarding information on the above study. I can confirm the approval of Gloucestershire Hospitals NHS Foundation Trust for the above study to proceed.

Your project will now be added to the Gloucestershire Health Community Research Register which will identify the following:

- Study Title: **As above**
- Chief Investigator: **As above**
- Sponsoring Organisation: **University of Bath**
- Host Organisation: **Gloucestershire Hospitals NHS Foundation Trust**
- Host Organisation **Gloucestershire Clinical Commissioning Group**
- Type of Study: **PhD**

It is important that all research conducted with NHS patients and/or staff complies with the Research Governance Framework. We would advise you to notify us at the above address, quoting our reference number for your study with regards to the following information.

- **Protocol Changes/Amendments to the study**
- **Change of Principal Investigator/local Research Team at site**



- **Untimely closure of study**
- **Final study closure date**
- **Final recruitment figure of study**

In relation to this I would like to take the opportunity to remind you of some of your responsibilities under this framework.

1. **Health and safety:** You are reminded of your responsibilities for health and safety at work under the Health and Safety at Work Act 1974. You have a legal responsibility to take care of your own and other people's Health and Safety at work under the Health and Safety at Work ACT 1974 as amended and associated legislation. These include the duty to take reasonable care to avoid injury to yourself and to others by your work activities or omissions, and to co-operate with your employer in the discharge of its statutory duties. You must adhere strictly to the policies and procedures on health and safety.

2. **Codes of confidentiality/Data Protection:** Anybody who records patient information (whether on paper or by electronic means) has a responsibility to take care to ensure that the data recorded is accurate, timely and as complete as possible. It is vital that you conduct your research in accordance with the principles of the Data Protection Act 1998 and codes of confidentiality.

3. **Liability and Indemnity:** Indemnity for your study will be as described in any applicable Clinical Trial Agreement or other Research Contract.
   Where such an agreement is not available, the Trust will indemnify its employees and researchers holding NHS Honorary Contracts for the purposes of Negligent Harm.
   NHS Trusts cannot provide cover for No Fault or Non-Negligent claims. Where this is required, it is expected that the Research Sponsor will provide such indemnity.

4. **Intellectual Property:** Intellectual Property is defined as the tangible output of any intellectual activity that is new or previously undescribed. It can include the following:

   i. Inventions, such as new medical devices, software;
   ii. Literary works, such as software, patient leaflets, journal articles;
   iii. Designs and drawings, such as posters, leaflets;
   iv. Brand names, such as logos and trademarks; and
   v. Trade secrets, such as surgical techniques.

   For projects originating from outside of the NHS Trust with which this agreement is made, Intellectual Property rights will remain with the Lead Site/Investigator unless developed from observations made outside of the scope and influence of the project. The rights to Intellectual Property generated in such a fashion will remain with the Host Trust unless an agreement to the contrary has been signed by both parties. Where a Clinical Trial Agreement or other Contract exists, this will take priority over this clause.

5. **Adverse Events/Incidents:** Any adverse events you witness or suspect to have happened *must* be reported to your supervisor or manager as soon as you know about them and dealt with as described in the research protocol.

6. **Fraud and Misconduct:** Any suspicions of active fraud or misconduct *must* be reported to your supervisor or manager immediately and will be treated in the strictest confidence. The monitoring of research will also seek to reduce incidents of research misconduct and fraud.

7. **Monitoring:** As part of the Research Governance Framework, during the course of your research you may be monitored to ensure that procedures in the protocol approved by the ethics committee are

8. **Dissemination:** The Framework also requires the dissemination of research findings to the research subjects, NHS staff and the public. On completion of your research you will be expected to produce a summary of the project and an indication of how the results from the study will be disseminated. For studies where publication of research results is not the responsibility of the local Investigator, requests for such information will be made to the sponsor.

9. **Termination of Agreement:** The Trust also reserve the right to terminate the agreement for your research to proceed if, at any time, you are found to be in breach of the clauses in this Approval Letter or fail to adequately meet the requirements of the Research Governance Framework.

If you need any further support or information, please do not hesitate to contact us at the above address, quoting our reference number for your study.

I wish you every success with your project

Yours sincerely,

Mark Walker
Senior Research Governance Manager
(Gloucestershire R&D Consortium)

13.4 NRES amendment approval

Health Research Authority

East Midlands - Nottingham 2 Research Ethics Committee

The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

Please note: This is the favourable opinion of the REC only and does not allow the amendment to be implemented at NHS sites in England until the outcome of the HRA assessment has been confirmed.

13 January 2017

Ms Jennifer Veeren
Pharmacy Department, Gloucestershire Royal Hospital
Great Western Road
GLOUCESTER
GL1 3NN

Dear Ms Veeren

Study title:	**Medicines related hospital admissions and medication reviews: patient and pharmacist perspectives**
REC reference:	**15/EM/0239**
Amendment number:	**SA1**
Amendment date:	**15 December 2016**
IRAS project ID:	**177528**

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Non-validated questionnaire	1.2	12 January 2017
Notice of Substantial Amendment (non-CTIMP)	SA1	15 December 2016
Other [Questionnaire Reminder Message]	1.0	12 January 2017

Research protocol or project proposal	1.4	12 January 2017

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

We are pleased to welcome researchers and R & D staff at our Research Ethics Committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

15/EM/0239:	**Please quote this number on all correspondence**

Yours sincerely

pp. S. O'Neill

Dr Ian Ross
Chair

E-mail: NRESCommittee.EastMidlands-Nottingham2@nhs.net

Enclosures: *List of names and professions of members who took part in the review*

Copy to: *Mr Mark Walker, Gloucestershire R&D Consortium*
Professor Jane Millar

East Midlands - Nottingham 2 Research Ethics Committee

Attendance at Sub-Committee of the REC meeting on 09 January 2017

Committee Members:

Name	*Profession*	*Present*	*Notes*
Mr Simon Deery	Public Health Registrar	Yes	
Dr Ian Ross	Retired Consultant Physician	Yes	Chair

Also in attendance:

Name	*Position (or reason for attending)*
Mrs Joanne O'Neil	REC Assistant

13.5 HRA approval

Health Research Authority

Ms Jennifer Veeren
Pharmacy Department, Gloucestershire Royal Hospital
Great Western Road
GLOUCESTER
GL1 3NN

Email: hra.approval@nhs.net

18 January 2017

Dear Ms Veeren

Letter of HRA Approval for a study processed through pre-HRA Approval systems

Study title:	**Medicines related hospital admissions and medication reviews: patient and pharmacist perspectives**
IRAS project ID:	**177528**
Sponsor	**University of Bath**

Thank you for your request for HRA Approval to be issued for the above referenced study.

I am pleased to confirm that the study has been given **HRA Approval.** This has been issued on the basis of an existing assessment of regulatory compliance, which has confirmed that the study is compliant with the UK wide standards for research in the NHS.

The extension of HRA Approval to this study on this basis allows the sponsor and participating NHS organisations in England to set-up the study in accordance with HRA Approval processes, with decisions on study set-up being taken on the basis of capacity and capability alone.

If you have submitted an amendment to the HRA between 23 March 2016 and the date of this letter, this letter incorporates the HRA Approval for that amendment, which may be implemented in accordance with the amendment categorisation email (e.g. not prior to REC Favourable Opinion, MHRA Clinical Trial Authorisation etc., as applicable). If the submitted amendment included the addition of a new NHS organisation in England, the addition of the new NHS organisation is also approved and should be set up in accordance with HRA Approval processes (e.g. the organisation should be invited to assess and arrange its capacity and capability to deliver the study and confirm once it is ready to do so).

Participation of NHS Organisations in England

IRAS project ID	177528

Please note that full information to enable set up of participating NHS organisations in England is not provided in this letter, on the basis that activities to set up these NHS organisations is likely to be underway already.

The sponsor should provide a copy of this letter, together with the local document package and a list of the documents provided, to participating NHS organisations in England that are being set up in accordance with HRA Approval Processes. It is for the sponsor to ensure that any documents provided to participating organisations are the current, approved documents.

For non-commercial studies the local document package should include an appropriate Statement of Activities and HRA Schedule of Events. The sponsor should also provide the template agreement to be used in the study, where the sponsor is using an agreement in addition to the Statement of Activities. Participating NHS organisations in England should be aware that the Statement of Activities and HRA Schedule of Events for this study have not been assessed and validated by the HRA. Any changes that are appropriate to the content of the Statement of Activities and HRA Schedule of Events should be agreed in a pragmatic fashion as part of the process of assessing, arranging and confirming capacity and capability to deliver the study. If subsequent NHS organisations in England are added, an amendment should be submitted to the HRA..

For commercial studies the local document package should include a validated industry costing template and the template agreement to be used with participating NHS organisations in England.

It is critical that you involve both the research management function (e.g. R&D office and, if the study is on the NIHR portfolio, the LCRN) supporting each organisation and the local research team (where there is one) in setting up your study. Contact details and further information about working with the research management function for each organisation can be accessed from www.hra.nhs.uk/hra-approval.

After HRA Approval

In addition to the document, *"After Ethical Review – guidance for sponsors and investigators"*, issued with your REC Favourable Opinion, please note the following:

- HRA Approval applies for the duration of your REC favourable opinion, unless otherwise notified in writing by the HRA.
- Substantial amendments should be submitted directly to the Research Ethics Committee, as detailed in the *After Ethical Review* document. Non-substantial amendments should be submitted for review by the HRA using the form provided on the HRA website, and emailed to hra.amendments@nhs.net.
- The HRA will categorise amendments (substantial and non-substantial) and issue confirmation of continued HRA Approval. Further details can be found on the HRA website.

IRAS project ID	177528

The HRA website also provides guidance on these topics and is updated in the light of changes in reporting expectations or procedures.

Scope

HRA Approval provides an approval for research involving patients or staff in NHS organisations in England.

If your study involves NHS organisations in other countries in the UK, please contact the relevant national coordinating functions for support and advice. Further information can be found at http://www.hra.nhs.uk/resources/applying-for-reviews/nhs-hsc-rd-review/.

If there are participating non-NHS organisations, local agreement should be obtained in accordance with the procedures of the local participating non-NHS organisation.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please email the HRA at hra.approval@nhs.net. Additionally, one of our staff would be happy to call and discuss your experience of HRA Approval.

HRA Training

We are pleased to welcome researchers and research management staff at our training days – see details at http://www.hra.nhs.uk/hra-training/.

If you have any queries about the issue of this letter please, in the first instance, see the further information provided in the question and answer document on the HRA website.

Your IRAS project ID is **177528**. Please quote this on all correspondence.

Yours sincerely

Mr Mark O'Toole

HRA Approval

Email: hra.approval@nhs.net

Copy to: *Professor Jane Millar*
Mr Mark Walker, Gloucestershire R&D Consortium

14 Appendix C: ICD-10 codes for HES study

Table 14-1 ICD-10 codes indicating a medicines-related admission

ICD-10 chapters		4 Character Diagnoses	
D	Drug-induced anaemia	D52.1	Drug-induced folate deficiency anaemia
		D59.0	Drug-induced autoimmune haemolytic anaemia
		D59.2	Drug-induced nonautoimmune haemolytic anaemia
		D61.1	Drug-induced aplastic anaemia
E	Endocrine, nutritional and metabolic diseases	E03.2	Hypothyroidism due to medicaments and other exogenous substances
		E06.4	Drug-induced thyroiditis
		E16.0	Drug-induced hypoglycaemia without coma
		E23.1	Drug-induced hypopituitarism
		E24.2	Drug-induced Cushing's syndrome
		E27.3	Drug-induced adrenocortical insufficiency
		E66.1	Drug-induced obesity
F	Mental and behavioural disorders	F13	Mental and behavioural disorders due to use of sedatives or hypnotics
		F19	Mental and behavioural disorders due to multiple drug use and use of other psychoactive substances
G	Diseases of the nervous system	G21.0	Malignant neuroleptic syndrome
		G21.1	Other drug-induced secondary parkinsonism
		G24.0	Drug-induced dystonia
		G25.1	Drug-induced tremor
		G25.4	Drug-induced chorea
		G25.6	Drug-induced tics
		G44.4	Drug-induced headache, not elsewhere classified
		G62.0	Drug-induced polyneuropathy
		G72.0	Drug-induced myopathy
H	Diseases of the eye and ears	H26.3	Drug-induced cataract
		H91.0	Ototoxic hearing loss
I	Diseases of the circulatory system	I42.7	Cardiomyopathy due to drugs and other external agents
		I95.2	Hypotension due to drugs
J	Diseases of the respiratory system	J70.2	Acute drug-induced interstitial lung disorders
		J70.3	Chronic drug-induced interstitial lung disorders
		J70.4	Drug-induced interstitial lung disorders, unspecified

K	Diseases of the digestive system	K71	Toxic liver disease
L	Diseases of the skin and subcutaneous tissue	L23.3	Allergic contact dermatitis due to drugs in contact with the skin
		L24.4	Irritant contact dermatitis due to drugs in contact with the skin
		L25.1	Unspecified contact dermatitis due to drugs in contact with the skin
		L27.0	Generalized skin eruptions due to drugs and medicaments
		L27.1	Localized skin eruptions due to drugs and medicaments
		L51.2	Toxic epidermal necrolysis (Lyell's Syndrome)
		L56.0	Drug phototoxic response
		L56.1	Drug photoallergic response
M	Diseases of the musculoskeletal system and connective tissue	M02.2	Postimmunization arthropathy
		M10.2	Drug-induced gout
		M32.0	Drug-induced systemic lupus erythematosus
		M34.2	Systemic sclerosis induced by drugs or chemicals
		M80.4	Drug-induced osteoporosis with pathological fracture
		M81.4	Drug-induced osteoporosis without pathological fracture
		M83.5	Other drug-induced osteomalacia in adults
		M87.1	Osteonecrosis due to drugs
N	Diseases of the genitourinary system	N14.1	Nephropathy induced by other drugs, medicaments and biological substances
		N14.2	Nephropathy induced by unspecified drugs, medicaments and biological substances
T	Injuries and consequences of external causes	T80.5	Complications following infusion, transfusion and therapeutic injection: anaphylactic shock due to serum
		T80.6	Complications following infusion, transfusion and therapeutic injection: other serum reactions
		T80.8	Other complications following infusion, transfusion or therapeutic injection
		T80.9	Unspecified complication following infusion, transfusion or therapeutic injection
		T88.0	Infection following immunization
		T88.1	Infection complication following immunization
		T88.2	Shock due to anaesthesia
		T88.3	Malignant hyperthermia due to anaesthesia
		T88.6	Anaphylactic shock due to adverse effect of correct drug or medicament properly administered
		T88.7	Unspecified adverse event of drug or medicament

Table 14-2 ICD-10 codes indicating an external cause of a medicines-related admission

Y40	Systemic antibiotics
Y41	Other systemic anti-infectives and antiparasitics
Y42	Hormones and their synthetic substitutes and antagonists
Y43	Primarily systemic agents
Y44	Agents primarily affecting blood constituents
Y45	Analgesics, antipyretics and anti-inflammatory drugs
Y46	Antiepileptics and Anti-Parkinsonism drugs
Y47	Sedatives, hypnotics and anti-anxiety drugs
Y48	Anaesthetics and therapeutic gases
Y49	Psychotropic drugs, not elsewhere categorised
Y50	Central nervous system stimulants, not elsewhere classified
Y51	Drugs primarily affecting the autonomic nervous system
Y52	Agents primarily affecting the cardiovascular system
Y53	Agents primarily affecting the gastrointestinal system
Y54	Agents primarily affecting the water-balance and mineral and uric acid system
Y55	Agents primarily acting on smooth and skeletal muscle and respiratory system
Y56	Topical agent primarily affecting skin and mucous membranes and ophthalmological, otorhinolaryngological and dental drugs
Y57	Other and unspecified drugs and medicaments
Y58	Bacterial vaccines
Y59	Other and unspecified vaccines and biological substance

15 Appendix D: Data collection tools and forms

15.1 Email to hospital pharmacists at GRH publicising the study

Dear Pharmacists,

NEW STUDY STARTING PATIENT RECRUITMENT NOW

As some of you may know I am doing a PhD at the University of Bath. The title of my study is:

'Medicines related hospital admissions and medication reviews: patients' and pharmacists' perspectives.

For the first stage of my study **I need to recruit 10 patients who have had a medicines-related admission to hospital** so that I can interview them about their experiences.

If you see any patients who have been admitted to hospital as a result of an issue with their medicines, please could you drop me an email with the **name, MRN number and location of the patient**. If it is easier, you could come and tell me who they are. I can then go and assess whether they are suitable for inclusion in the study.

If you would like to know more about the study, come and have a chat with me. I have attached a one-page summary for your interest.

Thank you in advance for your help,

Best Wishes,

Jenny

15.2 Poster displayed in pharmacy department and on wards publicising the study

UNIVERSITY OF BATH

Gloucestershire Hospitals NHS
NHS Foundation Trust

Has your patient been admitted to hospital because of a problem with their medicines?

Yes?

Then, please let me know.

I am conducting a study for my PhD investigating patients' experiences of a medicines related hospital admission.

I am looking for 10 patients to interview about their experiences.

What do you need to do?

If you think you have seen a suitable patient:

- Please email jennifer.veeren@glos.nhs.uk
- Please tell your patient about the study.

Thank you!

If you would like any further information, please email me.

15.3 One-page resume of study for HCPs recruiting patients for the study

Medicines related hospital admissions and medication reviews: patient and pharmacist perspectives

A study being conducted by Jenny Veeren, Clinical Pharmacist at GRH
as part of a PhD from the University of Bath

Why study this area?
Adverse drug reactions (ADRs) account for 3.7 – 5.3% of hospital admissions in England. Unnecessary admissions to hospital may be due to sub-standard medical care and obviously cost the NHS money. It is thought that medicines use reviews (MURs) by pharmacists may reduce medicines related admissions to hospital. However, little has been published about the experiences of patients who have a medicines related hospital admission and who receive a post discharge medication review by a pharmacist when they leave hospital (PD-MUR). Nor is much known about pharmacists' views of providing a PD-MUR to patients after discharge from hospital.

What is the aim of this study?
To explore the medication experiences of patients who have a medicines related admission to hospital and to examine the attitudes of community pharmacists to post-discharge MURs.

How will this be done?
The study will use an initial qualitative phase followed by a quantitative phase. The qualitative phase will involve interviewing up to 10 in-patients who have had a medicines related admission to hospital about their experiences. Details of their discharge medication will be sent to their community pharmacist to prompt an MUR after discharge. They will be interviewed again within 12 weeks of their hospital discharge about their experiences of all the different types of medication reviews they have had.

The next phase will involve conducting 4 – 6 interviews with community pharmacists about their attitudes and experiences of PD-MURs. The results of the patient and pharmacist interviews will inform the development of a questionnaire focussing on community pharmacists' attitudes to PD-MURs. This will be given to approximately 400 community pharmacists in south west England.

What do we hope to find out?
The patient interviews will be looked at to give an in-depth understanding of what it is like to be a patient in this situation. The community pharmacist questionnaires will be examined to explore the attitudes of the professionals providing the PD-MUR service.

How can you help?
If you see any patient who has been admitted to hospital because of a medicines-related problem and has the capacity to consent to participate in a study, please tell the patient about the study and email jennifer.veeren@glos.nhs.uk.

Your help would be greatly appreciated. Research in areas such as this can help to build a more complete picture of what it is like to be a patient and help us to understand whether we can improve the way in which we work.

If you would like any further information, please email me on the address above.

Thank you, Jenny

This study has been reviewed by East Midlands – Nottingham 2 NHS research ethics committee (REC ref: 15/EM/0239), the University of Bath research ethics committee and the NHS Research and Development department at Gloucestershire Hospitals NHS Foundation Trust (R&D ref:15/003/MTS). All of these bodies have given the study a favourable review.

15.4 Patient information sheet (supplied in booklet format)

Patient Information Sheet 03/06/15, version 1.2

Patient Information Sheet

Medicines related admissions to hospital and medication reviews: patient and pharmacist perspectives

A study investigating:

- what it is like to be a patient who has a medicines-related hospital admission
- how patients and community pharmacists feel about medication reviews.

Principal Investigator:
Jenny Veeren
Clinical Pharmacist
Gloucestershire Royal Hospital

1

Introduction

We would like to invite you to take part in our research study. Joining the study is entirely up to you. Before you decide we would like you to understand why the research is being done and what it would involve for you.

You are welcome to talk to others about the study if you wish. It is entirely up to you whether you choose to take part in the study. If you decide that it is not right for you to take part, this will not make any difference to your hospital care.

The first part of the Participant Information sheet tells you about the purpose of this study and what will happen if you take part.

In part 2 we give you more detailed information about the conduct of the study.

Please ask if there is anything you are not sure about.

Part 1 - What is involved?

What is the purpose of the study?
Some people are admitted to hospital because they have had problems with their medicines. We would like to find out what it is like to be a patient in this situation. This will give us information about what could be done to try and reduce the number of people who have a problem with their medicines which means they have to come into hospital.

Sometimes people are offered a medication review which is when you go and talk to a health care professional, e.g. a doctor or pharmacist, about your medicines and how you are getting on with them. Some studies have found that medication reviews can reduce the chance of people having problems with their medicines and therefore make it less likely that they would have to come into hospital because of a medication problem. We would like to know what it is like to be a patient who has had medication reviews and also what it is like for community pharmacists too. We hope this will help us to understand your experience and give us some ideas about whether the system could be improved.

There are two phases to the study. In the first phase of the study we want to find out what it is like to be a patient who has been admitted to hospital because of a medicines related problem. One example of a medicines related problem might be someone feeling dizzy as their blood pressure tablets are too strong. This will mean talking about the events leading up to your hospital admission and the medicines you have been taking.

In the second phase of the study we would like to find out about your experiences of medicines reviews. We would like to know what it is like to be a patient who has had reviews of their medicines by a doctor, pharmacist or any other health care professional. This will involve talking about medicines reviews you have had in the past.

This information will help us to understand some of the reasons why people are admitted to hospital with medicines related problems and then we can try to work out if these admissions could be prevented. The things you tell us about medicines reviews will help us to find out what it is like to be a patient who has discussed their use of medicines with a health care professional. This will help us to find out whether there can be any improvements to medication reviews.

We are hoping that approximately 10 people will agree to take part in our study which is being conducted as part of an educational project.

Why have I been invited?
You have been invited to take part because you have been admitted to hospital with a medicines related problem.

Do I have to take part?
No, it is entirely up to you whether you take part in our study. If you decide not to take part you will still receive exactly the same care and treatment and you do not have to give a reason. If you decide not to take part we will not refer you to your community pharmacist for a medication review after discharge. You are welcome to do this yourself, as it is a free service, and we would suggest that you take a copy of your discharge medication list with you.

What will happen to me if I take part?
If you decide to help us with our study we would talk to you on two occasions. The first will be whilst you are in hospital and we will ask you about your medicines and the events leading up to your hospital admission.

Before you leave the hospital, we will ask for your permission to send a copy of your discharge medication sheet to your usual community pharmacy.

Once you have been discharged from hospital, we will contact you within 12 weeks to arrange a second conversation. This can take place either at the hospital or in another public place e.g. a coffee shop. This time we will talk to you about any medicines reviews that you have had from you doctor, pharmacist or any other health care professional. We will ask you what they were like and what you thought of them.

Each conversation you have with us will be confidential and should last no longer than 30 minutes.

Both of these conversations will be audio-recorded but we will make sure that any comments you make cannot be traced back to you; they will be made anonymous.

Expenses and payments
You will receive a £5 High Street shopping voucher after taking part in each conversation as a thank you for helping us with our study.

If you have to pay any parking charges when you meet us for the second time, we will reimburse them for you.

What will I have to do?
To take part in our study, you will agree to talk to us on two occasions and allow us to send your discharge medication information to your usual community pharmacist.

What are the possible benefits of taking part?
By taking part in our study, you can help us to discover why people are admitted to hospital with medicines related problems. We hope that by the end of the study we will be able to make some suggestions about how some medicines related hospital admissions can be avoided.

We also want to find out about what it is like to be a patient who has had medicines reviews and whether you have found them helpful. We will also be asking community pharmacists about conducting medicines reviews for people who have recently been discharged from hospital. We hope that by putting all of this information together we can work out how to make the most of medicines reviews.

What are the possible disadvantages or risks of taking part?
There should not be any disadvantages or risks involved with taking part in the study. You will receive exactly the same care whether or not you take part.

You may find that talking about your medicines, and potentially your health makes you feel upset or distressed. This is not the aim of the study and you can choose what you would like to share with the researcher. If at any time you feel uncomfortable you can stop the discussion. If you change your mind and do not want to take part in the study, you can do so at any time. You can also request that we do not use any of the information you have given us up until the point that it has been made anonymous.

Will my taking part in the study be kept confidential?
Yes, what you tell us in our conversation will remain confidential. We will make sure that no-one can link your comments back to you.

If you tell us something about your medicines or your health that we are concerned about, we may suggest you contact your GP. If during our conversation we find out that there is any immediate risk to your health, we may contact your GP on your behalf.

What if there is a problem?
If you are worried about anything to do with the study, you can contact us using the information at the end of this sheet.

If you are still interested in taking part in the study, please read on.

Part 2 – Supporting information

What will happen if I don't want to carry on with the study?
If you decide that you no longer want to take part in the study you can let us know at any time. This is absolutely fine and the decision is completely up to you. You can withdraw the information you have given us up until the point that we have made it anonymous.

What if there is a problem?
If you are worried about anything you have been asked or any comments you have made, let us know. You can contact us using the details at the end of this sheet. If you have any concerns about your medicines or your health, you should discuss these with your usual community pharmacist or GP.

If you wish to make a complaint, please contact Professor Marjorie Weiss using the details at the end of this sheet.

Will my taking part in the study be kept confidential?
The conversations you have with the researcher (Jenny Veeren) will be audio-recorded with your consent and transcribed by the researcher (Jenny Veeren). These will be stored securely on a password-protected computer and only the researcher (Jenny Veeren) will have access to these.

All of the comments that you make will be made anonymous and no one will know what you have said. We will not let anyone know that you have taken part in the study unless you ask us to or if there are concerns about your medicines. The audio recording will be securely destroyed at the end of the study. The anonymised transcripts will be kept securely for 5 years and then destroyed confidentially.

Involvement of your GP
We will only let your GP know that you have taken part in our study if it is necessary for your health or wellbeing. Otherwise it is up to you whether you discuss the study with your GP.

What will happen to the results of the study?
The results of the study will be analysed and summarised. They will then be presented either as a poster, an oral presentation or as a published study in a scientific journal.

If you are interested, you can ask us to send you information about the results of the study. You can do this my filling in your address on the consent form.

Who is organising and funding the research?
The study has been organised by a collaboration between Gloucestershire Hospitals NHS Foundation Trust and the University of Bath. It is being sponsored and funded by the University of Bath.

Who has reviewed the study?
The study has been reviewed by East Midlands – Nottingham 2 NHS research ethics committee (REC ref: 15/EM/0239), the University of Bath research ethics committee

and the NHS Research and Development department at Gloucestershire Hospitals NHS Foundation Trust (R&D ref:15/003/MTS) . All of these bodies have given the study a favourable review.

Further information and contact details
If you would like any further information about the study or to make any comments/complaints you can contact us using the details below.

Principal Investigator:
Jenny Veeren
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GL1 3NN

Email: jennifer.veeren@glos.nhs.uk

Telephone: 0300 422 6147 or 0300 422 2222 and ask Operator to bleep 2464

Project Supervisor:
Professor Marjorie Weiss
Head of Pharmacy Practice
Department of Pharmacy and Pharmacology
Claverton Down
Bath
BA2 7AY

Email: m.weiss@bath.ac.uk

Telephone: 01225 386787

15.5 Patient consent form

Patient Consent Form 03/06/2015, version 1.2

Gloucestershire Hospitals NHS
NHS Foundation Trust

Patient Number:

Consent Form for First Interview

Medicines related admissions to hospital and medication reviews: patient and pharmacist perspectives

Please initial boxes

1. I confirm that I have read and understand the Information Sheet dated 3/6/2015 (version 1.2) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation in this study is voluntary and that I am free to withdraw at any time without giving a reason, without my medical or legal rights being affected. ☐
3. I agree to my discharge medication information being sent to my designated community pharmacy. ☐
4. I agree to my interviews being audio-recorded. ☐
5. I agree that anonymised quotations may be used in scientific publications. ☐
6. I agree to take part in the above study. ☐

_____	_____	_____
Name of participant	Signature	Date
_____	_____	_____
Name of person taking consent	Signature	Date

If you would like to receive the results of the study, please complete your address below:

When completed, one for patient, one for researcher

Patient Consent Form 03/06/2015, version 1.2

Patient Number:

Consent Form for Second Interview

Medicines related admissions to hospital and medication reviews: patient and pharmacist perspectives

Please initial boxes

1. I confirm that I have read and understand the Information Sheet dated 3/6/2015 (version 1.2) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation in this study is voluntary and that I am free to withdraw at any time without giving a reason, without my medical or legal rights being affected. ☐
3. I agree to my interviews being audio-recorded. ☐
4. I agree that anonymised quotations may be used in scientific publications. ☐
5. I agree to take part in the above study. ☐

_____	_____	_____
Name of participant	Signature	Date
_____	_____	_____
Name of person taking consent	Signature	Date

If you would like to receive the results of the study, please complete your address below:

When completed, one for patient, one for researcher

15.6 In-patient interview topic guide

Topic guide for in-patient interview 12/1/15, version 1

Patient Interview Topic Guide – In-patient interview

Theme	Potential questions
Demographic information	
Background to hospital admission	Can you tell me more about the circumstances that brought you into hospital? What role did medicines play in the admission? Any recent changes to medicines? Recent problems with medicines?
Knowledge and beliefs about medicine taking	Reasons for taking medicines Attitude to taking medicines
Sources of medicines advice	Who would they go to for advice about their medicines if they had any problems? Anyone else? Who would they trust to give the best advice about medicine use? Why?
Medication reviews	Do they know what a mediation review is? Have they had any medication reviews? Who with? How did they come about?
Referral details for community pharmacist post-discharge medication-use review	

15.7 Out-patient interview topic guide

Topic guide for out-patient interview 12/1/15, version 1

Patient Interview Topic Guide – Out-patient interview

Theme	Potential questions
Demographic information	
Post-discharge medicines-use review (PD-MUR)	Did you have a post-discharge medicines-use review (PD-MUR) with your community pharmacist after your discharge from hospital? How was it arranged? Where was it conducted? When was it conducted? Did the pharmacist have access to your hospital medication list? How? What happened during the PD-MUR? Were any problems identified? Was your GP contacted? Did it affect their knowledge/use of medicines? How did you find the process? Useful or not? What did you hope to gain from the PD-MUR?
Previous medication reviews	Have you had any medication reviews before this one? Was it a valuable process? Who with? Where? When? General views of medication reviews. Positive and negative aspects. Did they affect their knowledge/use of medicines? Who, in their opinion, is the best person to conduct a medication review? Why? Have they noticed any differences in the MURs delivered by different HCPs? Are MURs useful for particular aspects of treatment or conditions/care? e.g. adherence

Topic guide for out-patient interview 12/1/15, version 1

Longitudinal aspects of medication reviews	Have they had regular reviews over time? How do they feel about this as a continuous process? Useful or not? Do you think MURs are a good use of NHS resources?
Future medication reviews	Anything that could be done to improve medication reviews?
Gift voucher for participation	

15.8 Community pharmacist information sheet

Pharmacist Information Sheet 13/12/14, version 1

Medicines related admissions to hospital and medication reviews: patient and pharmacist perspectives

Introduction

We would like to invite you to take part in our research study. Joining the study is entirely up to you. Before you decide we would like you to understand the background to the research and what it would involve for you. **One of our team will go through the information sheet with you and answer any questions you may have.**

It is entirely up to you whether you choose to take part in the study. If you decide that you don't want to take part there will not be any consequences.

The first part of the information sheet tells you about the rationale for the study and what will happen if you take part.

In part 2 we give you more detailed information about the conduct of the study.

Please ask if there is anything you are not sure about.

Part 1 - What is involved

What is the purpose of the study?
The aim of the study is to find out about your experiences of post-discharge medicines use reviews (PD-MURs). We would like to talk to you to try and understand the facilitators and barriers to you carrying out PD-MURs and your general feelings towards them.

The views that you express during our interview will be compared with those of other pharmacists who conduct PD-MURs and will be used to devise an attitudinal questionnaire that will be sent to community pharmacists in the local area. This will enable us to gain an in-depth understanding of what issues affect your ability to carry out high quality PD-MURs for you patients.

We are hoping that approximately 4 – 6 pharmacists will agree to be interviewed and the resulting questionnaire will be sent to approximately 400 pharmacists.

Why have I been invited?
You have been invited to take part because you are a community pharmacist working in Gloucestershire.

Do I have to take part?
No, it is entirely up to you whether you take part in our study. If you decide not to take part it will not make any difference to your practice.

What will happen to me if I take part?
If you decide to help us with our study we will come and interview you in your community pharmacy on one occasion. The interview will be audio-recorded and should last no longer than 30 minutes. We will ask you about your experiences of PD-MURs and would like to hear about any issues, positive or negative, that have an impact on this area of your work.

After we have completed all of our interviews with community pharmacists, we will design our questionnaire. We would like feedback on our questionnaire before we send it out so we may send you the questionnaire and ask for your comments. This should take no more than 10 minutes.

Expenses and payments
If you agree to be interviewed, you will receive a £10 Amazon voucher (or an equivalent High Street voucher) as a thank you for helping us with our study.

What will I have to do?
To take part in our study, you will agree to be interviewed by us on one occasion.

What are the possible benefits of taking part?
By taking part in our study, you can help us to discover what it is like to be a community pharmacist offering a PD-MUR service to their patients. You will have the opportunity to tell us about the positive and negative aspects of offering this service. We hope that by the end of the study we will be able to identify the positive aspects of PD-MURs and make some suggestions about how they could be improved.

We are also asking patients about their experiences of medicines related admissions to hospital and medication reviews in general. We hope that by putting all of this information together we can work out how patients and community pharmacists can make the most of medicines reviews.

What are the possible disadvantages or risks of taking part?
There should not be any disadvantages or risks involved with taking part in the study. If at any time during the interview, you feel uncomfortable you can stop the discussion. If you change your mind about anything you have said you can let us know and we will not use it.

Will my taking part in the study be kept confidential?
Yes, what you tell us in our conversation will remain confidential. We will make sure that no-one can link your comments back to you. We will not let your employer know that you have taken part in our study and no companies will be named in any reports or publications.

What if there is a problem?
If you are worried about anything to do with the study, you can contact us using the information at the end of this sheet.

If you are still interested in taking part in the study, please read on.

Part 2 – Supporting information

What will happen if I don't want to carry on with the study?

If you decide that you no longer want to take part in the study you can let us know at any time. We will not use any of your comments and we will destroy any information you have already given us. This is absolutely fine and the decision is completely up to you.

What if there is a problem?
If you are worried about any comments you have made, let us know. You can contact us using the details at the end of this sheet.

If you wish to make a complaint, please contact Professor Marjorie Weiss using the details at the end of this sheet.

Will my taking part in the study be kept confidential?
The interviews you have with the researcher will be audio-recorded and transcribed by one of the research team. These will be stored securely by the principle investigator and only members of the research team will have access to these.

All of the comments that you make will be anonymised. The data generated by the study will be kept securely for 5 years and then destroyed confidentially.

What will happen to the results of the study?
The results of the study will be presented either as a poster, an oral presentation or as a published study in a scientific journal.

If you are interested, we can send you information about the results of the study.

Who is organising and funding the research?
The study has been organised by a collaboration between Gloucestershire Hospitals NHS Foundation Trust and the University of Bath. It is being sponsored and funded by the University of Bath.

Who has reviewed the study?
The study has been reviewed by an NHS research ethics committee, a University ethics committee and the NHS Research and Development department at Gloucestershire Hospitals NHS Foundation Trust. All of these bodies have given the study a favourable review.

Further information and contact details
If you would like any further information about the study or to make any comments/complaints you can contact us using the details below.

Principal Investigator:
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Telephone: 01225 386787

15.9 Community pharmacist consent form

Pharmacist Consent Form 09/12/14, version 1

Gloucestershire Hospitals NHS
NHS Foundation Trust

Pharmacist Number:

Consent Form

Medicines related admissions to hospital and medication reviews: patient and pharmacist perspectives

Please initial boxes

1. I confirm that I have read and understand the Information Sheet dated 13/12/14 (version 1) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation in this study is voluntary and that I am free to withdraw at any time without giving a reason. ☐
3. I agree to my interviews being audio-recorded. ☐
4. I agree to take part in the above study. ☐

_____	_____	_____
Name of participant	Signature	Date
_____	_____	_____
Name of person taking consent	Signature	Date

When completed, one for participant, one for researcher

15.10 Community pharmacist interview topic guide

Topic guide for community pharmacist interview 13/1/15, version 1

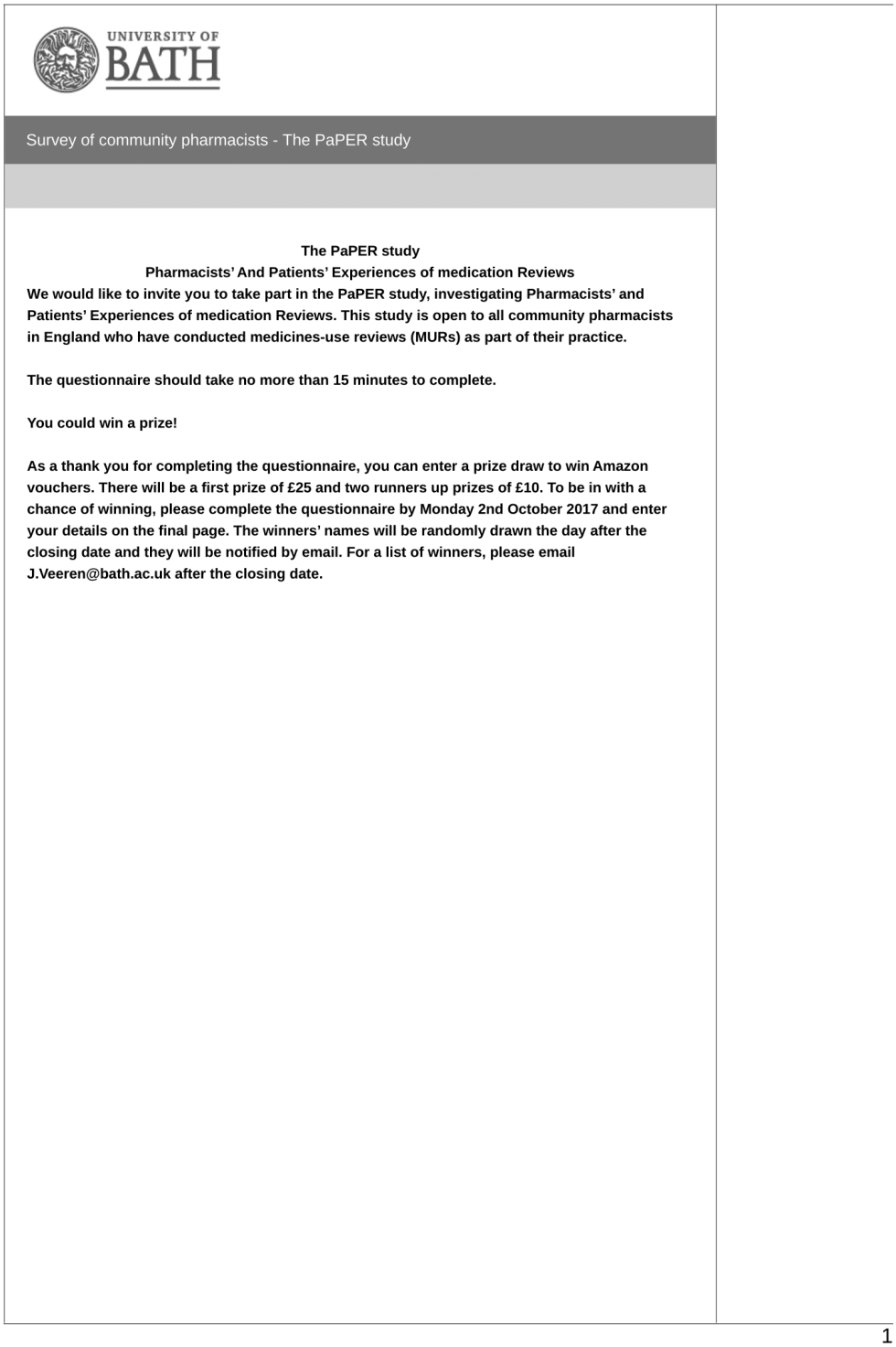
Community Pharmacist Interview Topic Guide

Theme	Potential questions
Demographic information about pharmacist and pharmacy premises	
Medicines-use reviews (MURs)	How many conducted in average week/month? How are patients recruited? Main factors affecting choice of patients for MURs. Any guidance on choosing patients for MURs e.g. from CCG/company/manager, any pressure to complete MURs in general of for certain patient groups? Do you think patients find MURs useful? Ever had any patient feedback?
Post-discharge medicines-use review (PD-MUR)	Have they conducted any PD-MURs? How did they know patient had been discharged? Did they have access to the discharge prescription? How did they go? What sort of issues were found? Were these different to the issues during a normal MUR? Useful service? To patients/pharmacists/GPs. What would facilitate PD-MURs? Notification from hospital/patient information/publicity with other HCPs
Longitudinal aspects of medication reviews	Relationships with regular patients? Repeat MURs useful? Long-term role in supporting effective medicines use and information/education?
Inter-professional relationships	Communication and feedback from GPs or any other HCPs e.g. practice pharmacists

Topic guide for community pharmacist interview 13/1/15, version 1

	Any communication with hospital pharmacists? Would that contact be useful? Any negative feedback?
Improving medication reviews	Positive and negative aspects of MURs/PD-MURs. Anything that could be done to improve medication reviews overall?
Gift voucher for participation	

15.11 Questionnaire



Survey of community pharmacists - The PaPER study

The PaPER study

Pharmacists' And Patients' Experiences of medication Reviews

We would like to invite you to take part in the PaPER study, investigating Pharmacists' and Patients' Experiences of medication Reviews. This study is open to all community pharmacists in England who have conducted medicines-use reviews (MURs) as part of their practice.

The questionnaire should take no more than 15 minutes to complete.

You could win a prize!

As a thank you for completing the questionnaire, you can enter a prize draw to win Amazon vouchers. There will be a first prize of £25 and two runners up prizes of £10. To be in with a chance of winning, please complete the questionnaire by Monday 2nd October 2017 and enter your details on the final page. The winners' names will be randomly drawn the day after the closing date and they will be notified by email. For a list of winners, please email J.Veeren@bath.ac.uk after the closing date.

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Additional information

The PaPER study has several phases and the aim of this phase of the study is to find out the views and attitudes of community pharmacists conducting medicines use reviews (MURs), and in particular reviews conducted after someone has been a hospital in-patient, referred to in this questionnaire as post-discharge medicines use reviews (PD-MURs).It does not matter if you have not conducted any PD-MURs, we are still interested in your opinions. Participation in the study is entirely voluntary and there are no right or wrong answers, we are just interested in your views and experiences.

The responses that you provide will be combined with those of other community pharmacists and used to explore the attitudes and views of community pharmacists as a whole towards MURs. Your answers will be kept confidential and will be seen only by the researcher. The data will be held securely in password-protected files on a password protected PC and retained for a period of five years.

The results of the study will help us to understand what it is like for community pharmacists providing the MUR service and whether there is anything that could be improved to help patients to manage their medicines better. The findings of this phase of the study will be written up and disseminated in scientific journals and at conferences. You and the organisation you work for will not be identified in any way.

The benefits of taking part are that you can voice your opinion about this important area of pharmacy practice. It is not anticipated that there are any risks in taking part.

The study is part of a PhD project sponsored and funded by the University of Bath. It has been given a favourable ethical review by an NHS research ethics committee (15/EM/0239) and the University of Bath.

Further information and contact details
If you would like further information about the study, a summary of the results, to make any comments/complaints or to withdraw from the study you can contact us using the details below.

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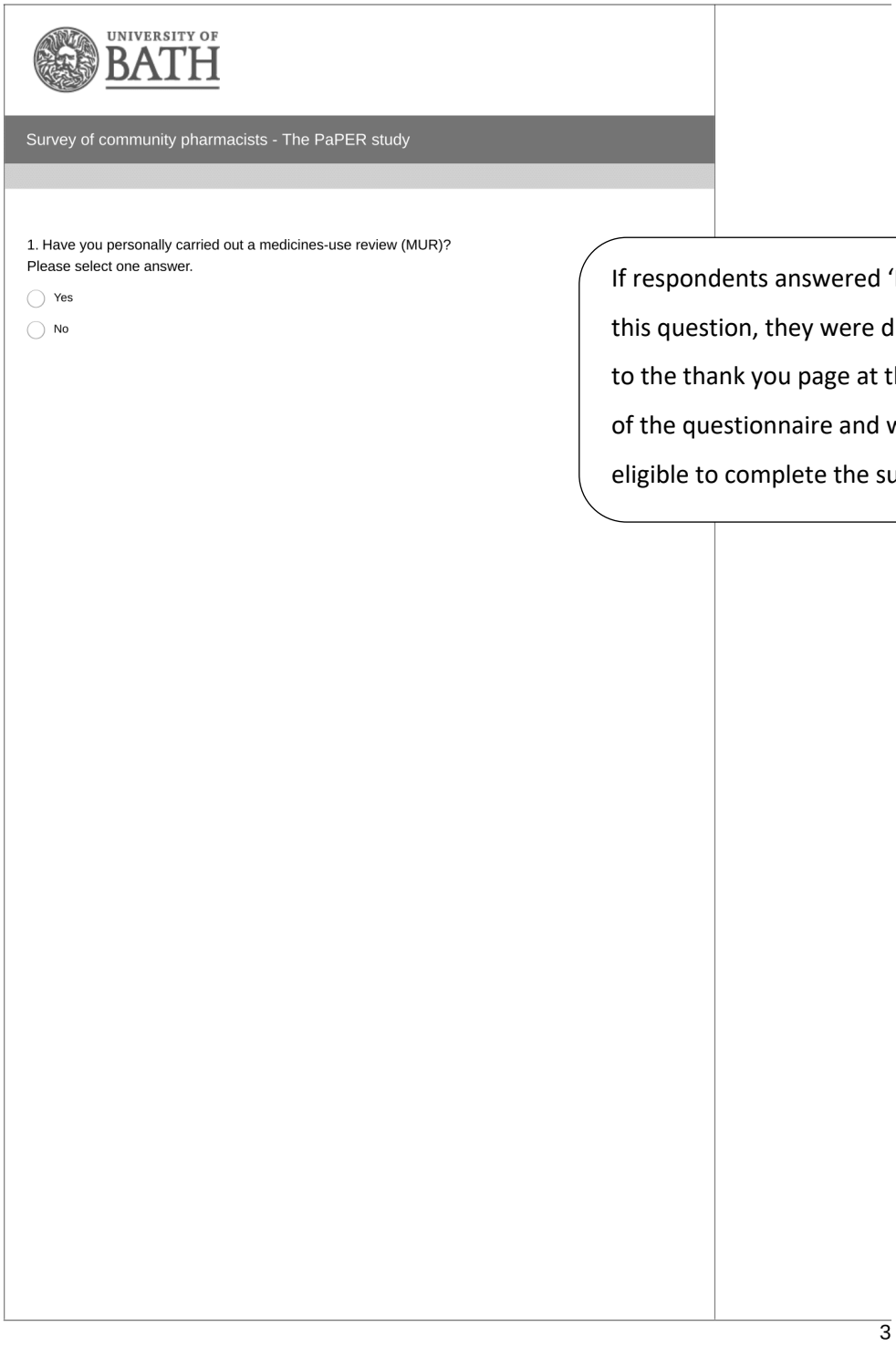

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1. Have you personally carried out a medicines-use review (MUR)?
Please select one answer.

- Yes
- No

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If respondents answered ‘No’ to this question, they were directed to the thank you page at the end of the questionnaire and were not eligible to complete the survey.

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2. Approximately how many MURs did you conduct last month?
Please select ONE answer.

- ○ Up to 10
- ○ 11 to 20
- ○ 21 to 30
- ○ More than 30
- ○ Prefer not to say
- ○ Other (please specify)

3. Approximately what proportion of the MURs you conducted last month were for patients who had recently been a hospital in-patient?
Please slide the bar to your chosen percentage.

0 % 100 %

4. Who usually informs you that someone has been a hospital in-patient?
Please select the ONE that applies most frequently.

- ○ Patient
- ○ Patient's family/carer/representative
- ○ Hospital
- ○ GP
- ○ Don't find out at all
- ○ Other (please specify)

5. How do you receive information about people who have been a hospital in-patient?
By information, we mean anything that lets you know about dates of admission or discharge, or a list of medicines or a discharge summary.
Please select ALL that apply.

- [ ] Telephone
- [ ] Fax
- [ ] Email
- [ ] By accessing Pharmoutcomes or other computer software (please state the name of the software in the 'other' text box below)
- [ ] Automatically integrates into your patient medication record (PMR)
- [ ] By accessing the patient's hospital records
- [ ] Don't know

Other (please specify)

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6. The following questions focus on your views and experiences of different aspects of your role. Please respond to each statement as honestly as possible with ONE answer.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
Two-way communication is an important part of a good relationship with GPs.	○	○	○	○	○	○
Community pharmacists are able to build long-lasting trusted relationships with their patients.	○	○	○	○	○	○
The majority of patients are aware of the MUR advanced services.	○	○	○	○	○	○
Community pharmacists are able to make valuable contributions to patient care through the MUR service.	○	○	○	○	○	○
GPs in my local area ask for my advice about medicines-related issues for their patients.	○	○	○	○	○	○
Community pharmacists have the right skills to perform high-quality MURs.	○	○	○	○	○	○
PD-MURs are more complex and time consuming than other types of MURs.	○	○	○	○	○	○
GPs have a high regard for the contribution that community pharmacists make to the care of their patients.	○	○	○	○	○	○

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7. The following questions focus on your views and experiences of different aspects of your role. Please respond to each statement as honestly as possible with ONE answer.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
Patients value the contribution that community pharmacists make to their care, over and above the supply of medicines.	○	○	○	○	○	○
Community pharmacists cannot conduct MURs properly unless they have access to the patient's GP medical record.	○	○	○	○	○	○
MURs are a waste of time.	○	○	○	○	○	○
Community pharmacists would be able to provide a better service to patients recently discharged from hospital if they could conduct PD-MURs in the patient's home.	○	○	○	○	○	○
GPs view community pharmacists as just the suppliers of their patients' medicines.	○	○	○	○	○	○
Hospital pharmacists should promote the PD-MUR service to patients when they are in hospital.	○	○	○	○	○	○
GPs know where to find medicines-related information to make safe prescribing decisions.	○	○	○	○	○	○
MURs are a waste of money.	○	○	○	○	○	○

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8. The following questions focus on your views and experiences of different aspects of your role. Please respond to each statement as honestly as possible with ONE answer.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
Patients see community pharmacists as just the suppliers of their medicines.	○	○	○	○	○	○
I find conducting MURs a satisfying part of my job.	○	○	○	○	○	○
Community pharmacists require access to the patient's GP medical record to conduct a PD-MUR.	○	○	○	○	○	○
GPs should refer patients to community pharmacists for MURs.	○	○	○	○	○	○
Community pharmacists can provide patients with better information about medicine safety and use than GPs.	○	○	○	○	○	○
I believe that MURs help patients to get the most benefit from their medicines.	○	○	○	○	○	○
Community pharmacists should automatically be sent a copy of the patient's discharge summary.	○	○	○	○	○	○
GPs should provide feedback to community pharmacists when recommendations are made as the result of an MUR.	○	○	○	○	○	○

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9. The following questions focus on your views and experiences of different aspects of your role. Please respond to each statement as honestly as possible with ONE answer.

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Don't know
MURs are not conducted on patients with the most complex medicines needs.	○	○	○	○	○	○
Patients are willing to discuss post-discharge medicines-related issues with their community pharmacist.	○	○	○	○	○	○
Community pharmacists routinely identify major issues relating to patient safety.	○	○	○	○	○	○
Patients should have to make an appointment with their community pharmacist for an MUR.	○	○	○	○	○	○
Community pharmacists and hospital pharmacists should have a two-way process for communication.	○	○	○	○	○	○
GPs should conduct more thorough medicines reviews for patients so MURs are not required.	○	○	○	○	○	○
There is the right skill-mix in the pharmacy to enable MURs to be conducted.	○	○	○	○	○	○

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Thinking now about post-discharge medicines-use reviews in a bit more detail.

10. Which healthcare professional, in your opinion, would be most appropriate to conduct a medication review after someone has been a hospital in-patient?
Please select ONE answer.

- ◯ Community pharmacist
- ◯ Pharmacist in a GP surgery
- ◯ GP
- ◯ Pharmacist specifically employed to ensure safe transfer of care from secondary care to primary care e.g. an interface or intermediate care pharmacist
- ◯ Hospital pharmacist
- ◯ Practice nurse
- ◯ Don't know
- ◯ Other (please specify)

11. Please rate each profession on their appropriateness to conduct a medication review after someone has been a hospital in-patient.
For each profession choose a response from ONE to TEN, with one being inappropriate and ten being completely appropriate.

	1	2	3	4	5	6	7	8	9	10
Community pharmacist	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Pharmacist working in a GP surgery	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
GP	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Pharmacist specifically employed to ensure the safe transfer of care from secondary to primary care e.g. an interface or intermediate care pharmacist	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Hospital pharmacist	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
Practice nurse	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

12. What information would you like when someone is discharged from hospital after an in-patient stay? Please select ONE answer.

- ◯ Nothing
- ◯ Notification of admission and/or discharge date only
- ◯ A list of current medicines
- ◯ A list of current and discontinued medicines
- ◯ Full hospital discharge summary including clinical details of the admission, co-morbidities and new diagnoses
- ◯ Don't know
- ◯ Other (please specify)

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13. How would you prefer to receive information about people who have recently been hospital in-patients? Please select ONE answer.

- ○ Telephone
- ○ Fax
- ○ Email
- ○ By accessing Pharmoutcomes or other computer software (please state the name of the software in the 'other' text box below)
- ○ Automatically integrates into the PMR
- ○ By accessing the patient's hospital records in a similar way to the summary care record
- ○ Don't know
- ○ Other (please specify)

14. Is there anything else you think should be done to improve the care of patients recently discharged from hospital?

15. Are there any other comments that you would like to make? Please insert in the box below.

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About you and the pharmacy/pharmacies that you work in

16. What is your gender identity?

- ○ Male
- ○ Female
- ○ Other
- ○ Prefer not to say

17. Please tell us the year you qualified as a pharmacist?
This is the year you joined the RPSGB or GPhC register.
If you prefer not to say, please leave blank.

Year

18. Which sectors of pharmacy do you currently work in?
Please select ALL that apply.

- ☐ Community
- ☐ Hospital
- ☐ Primary care/CCG
- ☐ GP surgery
- ☐ Industry
- ☐ Academia
- ☐ Prefer not to say
- ☐ Other (please specify)

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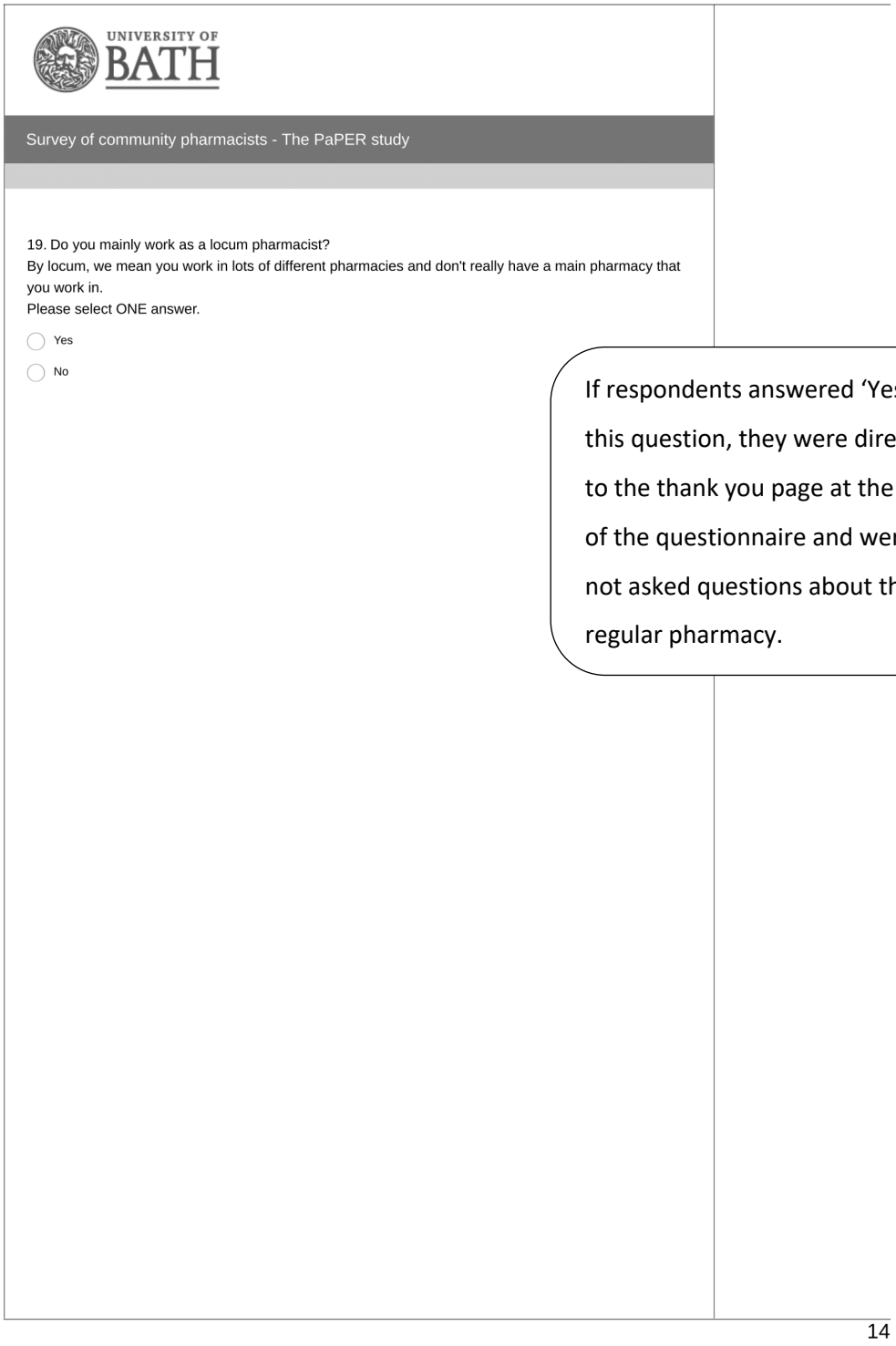

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19. Do you mainly work as a locum pharmacist?
By locum, we mean you work in lots of different pharmacies and don't really have a main pharmacy that you work in.
Please select ONE answer.

- ◯ Yes
- ◯ No

If respondents answered 'Yes' to this question, they were directed to the thank you page at the end of the questionnaire and were not asked questions about their regular pharmacy.

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Thinking now about the community pharmacy that you MOST COMMONLY work in, please answer the following questions.

20. Please could you enter the POSTCODE of the pharmacy.
If you can't remember the postcode, please enter the street and town.
Please note we will not identify you or your pharmacy in any results. This is just to help with the analysis such as whether the pharmacy in is a rural or urban area.
If you prefer not to answer, please leave blank.

Postcode

Street/town

21. How would you best describe the pharmacy that you normally work in?
Please select ONE answer.

- ○ Independent (less than 5 pharmacies)
- ○ Small multiple (6 to 10 pharmacies)
- ○ Medium size multiple (11 to 50 pharmacies)
- ○ Large multiple (more than 50 pharmacies)
- ○ Supermarket
- ○ Not sure
- ○ Prefer not to say
- ○ Other (please specify)

22. Is the pharmacy located within a GP surgery?
Please select ONE answer.

- ○ Yes
- ○ No
- ○ Other (please specify)

23. Approximately how many hours is the pharmacy open each week?
Please select ONE answer.

Examples:
9am – 5.30pm, Monday to Saturday, closed for lunch for an hour a day = 45 hours
8am – 8pm, Monday to Saturday, 10am – 4pm, Sunday = 78 hours
7am – 11pm, Monday to Saturday, 10am – 4pm, Sunday = 102 hours

- ◯ Less than 50 hours
- ◯ 50 to 99 hours
- ◯ 100 hours or more
- ◯ Not sure
- ◯ Prefer not to say
- ◯ Other (please specify)

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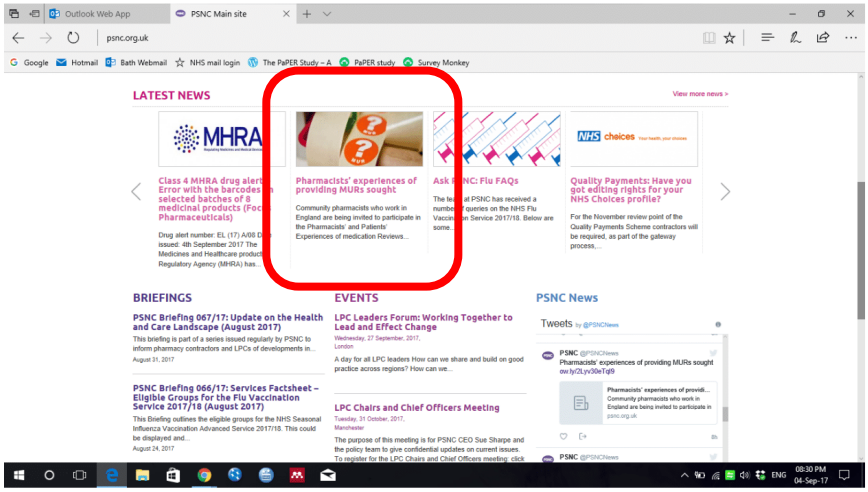
The questionnaire is now compete, thank you for taking the time to answer our questions.

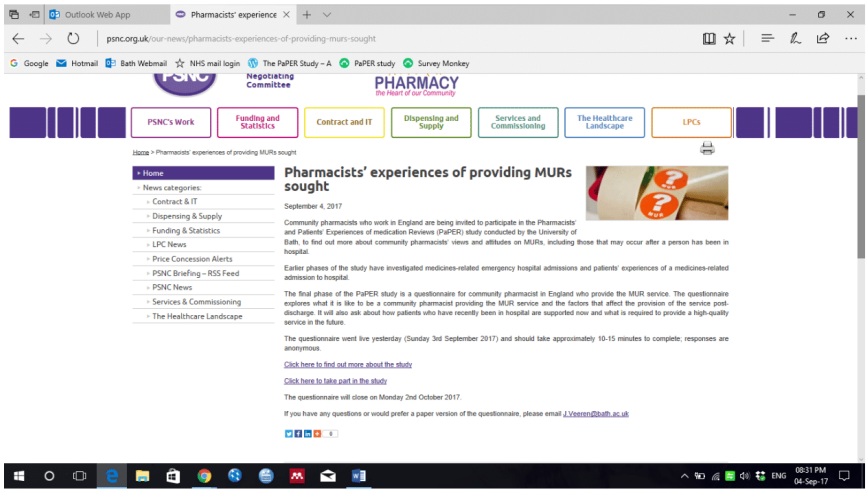
24. If you would like to enter the prize draw to win Amazon vouchers, please complete your details below.

Name

Email address

15.12 Screenshots of publicity on PSNC website





15.13 Email to community pharmacists sent by the PDA

Dear << Test First Name >>,

The PDA supports research into the provision of pharmacy services and from time to time seeks the contribution of members towards academic studies in this field.

The purpose of this email is to invite community pharmacists providing MURs to complete a short anonymous questionnaire which should take no longer than 10 to 15 minutes to complete.

The objective of this survey is to find out more about community pharmacists' views and attitudes of medicines-use reviews (MURs), including those that may occur after a person has been in hospital.

The pharmacist conducting the research is Jenny Veeren who is undertaking a PhD at the University of Bath. Jenny would like to find out what it is like to be a community pharmacist providing these services and to explore the factors that affect pharmacists' work in this area.

Participation in the study is by completion of an anonymous questionnaire. It is entirely voluntary and there are no right or wrong answers, you just need to have conducted some MURs in England.

If you would like to take part, please click the button below:

Complete The Survey

If you would like to find out more about the study, please click here:

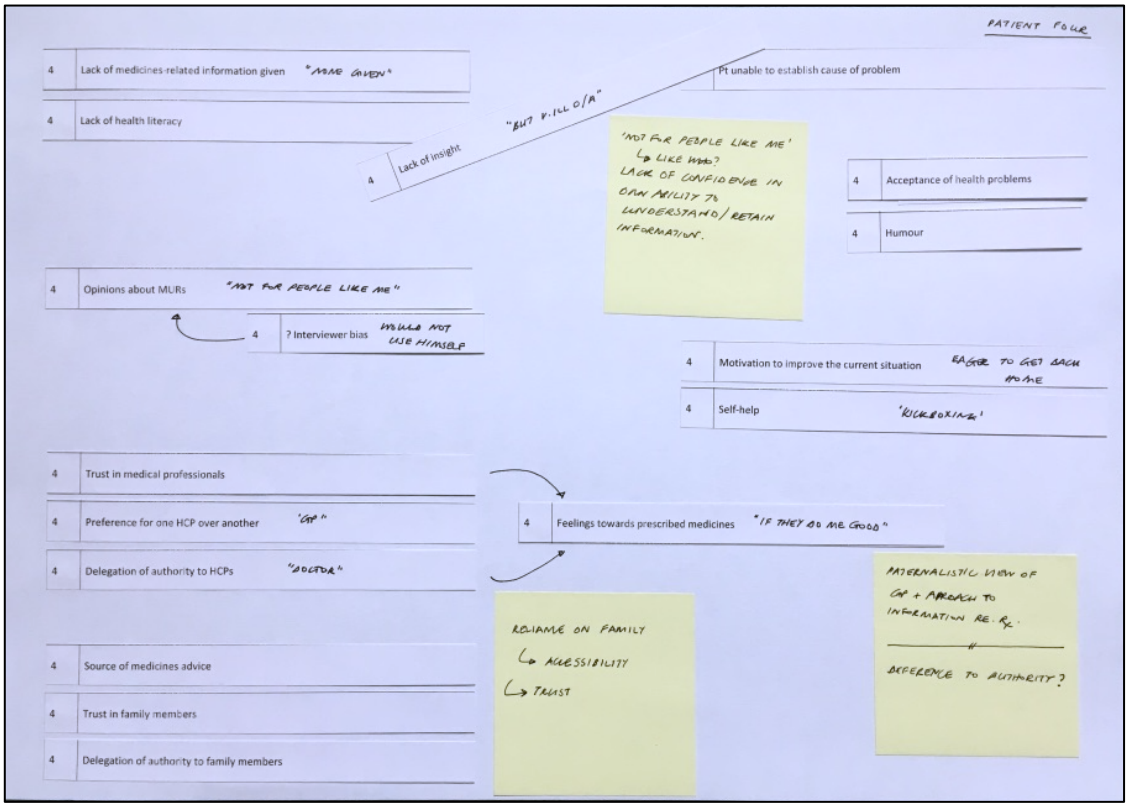
- http://www.thepaperstudy.wordpress.com/

If you have any questions or would prefer a paper version of the questionnaire, Jenny can be contacted at: J.Veeren@bath.ac.uk

Kind regards,

16 Appendix E: Analysis of data

16.1 Patient interviews: Thematic analysis photograph



16.2 Community Pharmacist Survey: Plan of statistical tests

Analysis Plan for Questionnaire

Descriptive statistical analysis	
Number of MURs conducted in previous month	*Mean* number of MURs per pharmacist
Percentage of MURs that were PD-MURs	*Mean* percentage of MURs that were PD-MURs
Who usually informs pharmacists that patient in hospital	*Bar chart/pie chart/table* of who informs pharmacist
How is information about hospital admission received	*Bar chart/table* of method of communication
Likert scale attitudinal statements	*Exploratory factor analysis**
Most appropriate healthcare professional for PD-MUR	*Bar chart/pie chart/table* of which professional most appropriate
Rate each professional	*Mean* score for each professional group regarding appropriateness for PD-MURs
What information on discharge	*Bar chart/table* of preferred information on discharge
How to transfer discharge information	*Bar chart/pie chart/table* of preferred method of communication
Gender	*Percentages* male v. female
Year of qualification	*Mean, median, mode or range* of number of years qualified
Sectors of pharmacy worked in	*Bar chart/table* of sectors
Type of pharmacy	*Bar chart/pie chart/table* of types of pharmacy
Pharmacy located in GP surgery	*Chart/pie chart/table* of co-location with GP
Hours pharmacy open	*Bar chart/pie chart/table* of number of hours pharmacy open

Inferential statistical analysis	
Independent variables	**Dependent variables**
Gender (categorical-nominal) Degree type (categorical-nominal) Qualified before or after new contract in 2005 (categorical-nominal) Urban or rural location (categorical-nominal) Type of pharmacy (categorical-nominal) Opening hours (categorical-nominal) Working in GP surgery (categorical-nominal) Pharmacy located in GP surgery (categorical-nominal) Number of prescription items dispensed (numerical or categorical-ordinal) Sector(s) of pharmacy worked in (categorical-nominal)	Number of MURs (categorical-ordinal) Percentage of MURs that were PD-MURs (numerical or categorical-ordinal) Attitudes to different factors (categorical-ordinal) (Bowling, 2009, p. 316) Most appropriate HCP for PD-MUR (categorical-nominal) Information on discharge (categorical-nominal) How to send information on discharge (categorical-nominal)

17 Appendix F: Presentations and Publications

17.1 Presentation abstracts

17.1.1 Health Services Research and Pharmacy Practice Conference 2016

Oral presentation at the University of Reading, 7-8 April 2016

The findings show that CP staff are sometimes required to work outside of procedures. This is frequently due to situational factors such as the need to work quickly, with staff often taking shortcuts in order to get the work done for patients. Implications for practice may include greater communication between CP staff regarding violations in order to encourage a good safety culture. Whilst this study has a relatively small sample size, it provides an awareness of challenges faced when attempting to adhere to policies in CPs. Future work is needed to explore how typical these violations are of work in practice.

1. Reason J, Parker D, Lawton R. Organizational controls and safety: the varieties of rule-related behaviour. Journal of Occupational and Organizational Psychology. 1998; 71(4): 289–304.
2. Reason J, Parker D, Free R. Bending the rules: the varieties, origins and management of safety violations. Leiden: University of Leiden. 1994.

Trends in emergency hospital admissions for adverse drug reactions in England 2008–2014: an epidemiological study using hospital episode statistics (HES) data

J.C. Veeren[a,b], M. Weiss[a] and A. Taylor[a]

[a]University of Bath, UK and [b]Gloucestershire Royal Hospital, UK
prmjv@bath.ac.uk

The aim of the study was to determine the trends in emergency admissions and bed days utilised due to adverse drug reactions (ADRs) in England between 2008 and 2014.

The study examined annual Hospital Episode Statistics (HES) data from 2008/9 to 2013/14. The data contain details of all hospital admissions, outpatient and A&E attendances at NHS hospitals in England. Data are routinely collected by hospital trusts and are publically available on the HES website.[1] Data were extracted from the HES annual spreadsheets for emergency admissions using International Classification of Diseases 10th Edition (ICD-10) codes that indicated an ADR was the primary cause of the hospital admission. Codes were chosen based on previous work by Wu et al [2] and included both diagnostic codes and codes relating to external causes of an ADR related admission. Over 100 different ICD-10 codes were included in this study, these codes were all definite drug-related admissions as they included a drug name within the code. Data were analysed descriptively using means and frequencies.

As with any data that is collected and entered by many different individuals there is the potential of error. Due to the anonymisation of data, it was not possible to identify and correct errors at the data extraction stage.

No ethical approval was needed as the study used publically available, anonymised data that is accessible on the HES website.

Total emergency hospital admissions increased by 8.1%, from 5,010,670 in 2008/9 to 5,415,462 in 2013/14. Over the same period, emergency admissions due to ADRs increased from 60 055 in 2008/9 to 88 157 in 2013/14. This was an increase of 46.8%. These figures reveal an increase in the proportion of emergency hospital admissions due to ADRs over the period of study, from 1.2% in 2008/9 to 1.6% in 2013/14.

The total number of bed days decreased by 8.1%, from 51,841,443 in 2008/9 to 47,651,028 in 2013/14. Despite this overall decrease, the number of bed days that were utilised due to ADRs increased from 625,011 (1.2% of all bed days) in 2008/9 to 896,270 (1.9% of all bed days) in 2013/14.

The top three most common reasons for drug-related admissions were mental and behavioural disorders due to drugs, hypotension due to drugs and generalised skin eruptions due to drugs.

These results show that an increasing proportion of emergency admissions to NHS hospitals in England from 2008/9 to 2013/14 were due to ADRs. Despite a reduction in the number of bed days used in NHS hospitals in England over this period, the proportion that were occupied due to ADRs increased.

Limitations include the use of a national dataset that is primarily used as a tool for payment rather than being used for research. Missing data and diagnostic misclassification of admissions have the potential to affect the results of this study.

This study demonstrates that the burden of ADRs in NHS hospitals in England is increasing and initiatives to reduce them should be prioritised.

1. Health and Social Care Information Centre (2015) *What HES data are available?* Available from http://www.hscic.gov.uk/hesdata (accessed 8/10/2015).
2. Wu T-Y, Jen M-H, Bottle A, Molokhia M, Aylin P, Bell D, et al. Ten-year trends in hospital admissions for adverse drug reactions in England 1999–2009. *J R Soc Med.* 2010; 103: 239–250.

A direct observation study of medication administration errors in a mental health inpatient setting

H. Abduldaeem[a], K. Masters[b], N. Patel[a] and P. Donyai[a]

[a]Pharmacy, University of Reading, Reading, UK and [b]Pharmacy, Berkshire Healthcare NHS Foundation Trust, Reading, UK
p.donyai@reading.ac.uk

Medication administration errors (MAEs) are relatively unexplored within psychiatric settings. One UK study found an association between MAEs and nurse inter-

17.1.2 Health Services Research and Pharmacy Practice Conference 2017

Oral presentation at the University of Nottingham, 10-11 April 2017

Issues with the waiting times may have been due to patients collecting prescriptions at particularly busy times at the pharmacy or having particularly complex prescriptions that require more time to screen. In general, however, there was good patient satisfaction with the satellite pharmacy service. There is room for improvement in the waiting area and times, and expectations of the patient when obtaining their prescription as well as information and advice given. In future studies the questionnaire could be given to patients after they collect their prescription and over different three week time periods.

Attitudes towards medicines-related information and support: a qualitative study of hospital in-patients

J. C. Veeren[a,b], M. Weiss[a] and A. Taylor[a]

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[b]Gloucestershire Royal Hospital, UK
prmjv@bath.ac.uk

Medicines-related problems result in a significant number of hospital admissions each year, however little is known about where affected patients get medicines information and support from.

The aim of the study was to determine the views of hospital in-patients, who had been admitted with a medicines-related problem, about who they seek medicines-related information from and their opinions of medicines-use reviews (MURs).

This study used a qualitative approach involving semi-structured interviews with seven hospitals' in-patients from one acute Trust in South West England who had been admitted to hospital due to a medicines-related problem. Participants, identified by Trust staff during their normal duties, had to look after their own medicines, be able to visit their GP and community pharmacy and have capacity to consent to participate. The principal investigator asked the patients about their views of medicine-taking in general and more specifically about who they would ask for advice about medicines, who was in the best position to give them information about medicines and their experiences of MURs. The questions were developed based on a review of the published literature.

The interviews were transcribed and analysed using interpretative phenomenological analysis (IPA), a technique that focuses on understanding the personal lived experience of an individual and how they interpret it. This technique involves interviewing a relatively small number of participants in detail about their experiences.

Ethical approval was obtained from the NHS and the University of Bath.

Seven patients were interviewed; 4 women and 3 men, all over the age of 65. Interview analysis using IPA found that patients were accepting of taking medicines prescribed by their doctor as they felt the doctor would only prescribe things that would 'do them good'. Patients described their medicines-related admission to hospital as 'terrible' and 'being in hell'.

There was a difference of opinion amongst the patients as to whom they would ask about their medicines. This depended on two factors: accessibility and trust. Patients reported problems with accessing their preferred GP and this meant they tended to ask family members or carers for information about their medicines. Other patients only discussed their medicines queries with their GP as the prescriber.

Some patients reported their community pharmacist was their preferred information source for a medicines-related query. However, the majority of patients interviewed lacked confidence in their ability to understand and retain medicines-related information given to them. Such patients preferred not to receive information about their medicines or participate in a MUR.

As the study was conducted at a single site, the results may not be generalisable. There were also limitations due to the small number of participants. Data saturation may not have been reached as patients of different ages, social backgrounds and level of education may have given differing responses.

The results are important as they highlight that some patients would not choose their pharmacist as a source of medicines information. Even patients who thought that pharmacists would provide the best advice about medicines, said they would not personally use them. Several patients reported that they were not interested in a MUR.

The findings suggest there are challenges in encouraging patients to engage with community pharmacists about medicines-related issues. Future research should focus on how community pharmacists can best support this patient group.

A nationwide questionnaire study of patient satisfaction with the Medicines Use Review pharmacy service

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The Medicines Use Review (MUR) is a community pharmacy service funded by the NHS to improve patients' adherence to medication and/or reduce medicines waste. No rigorously-tested instrument exists to measure patient satisfaction with MURs despite evidence that patient satisfaction is a significant indicator of the success of healthcare services.

Our aim was to assess patient satisfaction with the MUR by developing, validating, and utilising a new MUR patient satisfaction questionnaire (MUR-PSQ).

17.1.3 Health Services Research and Pharmacy Practice Conference 2019

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Improving communication across the primary-secondary care interface: a survey of the attitudes and experiences of community pharmacists in England

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Introduction

Transitions of care, such as when patients are discharged from hospital, are a high-risk time. Errors or discrepancies in medication affect 30-70% of patients during these tranitions[1] and the cost to the NHS of post-discharge medication-related harm in older adults is an estimated £396 million per year.[2] Community pharmacists are in an ideal position to support patients during these transitions.

Aims

The aim of the survey was to determine the attitudes and experiences of community pharmacists providing the Medicines Use Review (MUR) service in England, with an emphasis on the provision of discharge medicines support.

Methods

A questionnaire was designed based on interviews with patients (n=7) who had been admitted to hospital with a medicines-related problem, interviews with community pharmacists who provided the MUR service in England (n=5) and a review of the literature. It was piloted with academic pharmacists and community pharmacists. The questionnaire contained a variety of attitudinal statements that were measured using Likert scale responses and factual questions about the community pharmacists themselves, their pharmacy and their provision of MURs. The questionnaire was completed electronically by 495 community pharmacists in England. As they were recruited via professional networks and social media, it was not possible to determine the response rate. The responses to the questionnaire were analysed with IBM SPSS Statistics, version 24, using descriptive statistics and non-parametric tests including the Kruskal-Wallis and Mann-Whitney U tests.

Results

The results showed that 17.4% (n=432) of community pharmacists who responded did not find out when one of their regular patients had been in hospital. When they did find out, the information came from a variety of sources, highlighting deficiencies in communication. Community pharmacists want to

be involved in supporting patients with their medicines post-discharge. Eighty nine percent (n=382) of community pharmacists said they would like to see the full discharge summary and 78.8% (n=363) wanted it to be sent or accessed electronically. Respondents wanted to be more integrated into the teams caring for patients at the time of discharge. As shown by the 93.8% (n=373) of community pharmacists who thought they should have two-way communication with hospital pharmacists and the 55% (n=382) who thought they should have access to the patient's medical record to conduct a post-discharge MUR. Pharmacists believed they were well placed to provide patients with medicines-related support after discharge as 94.9% (n=414) felt they could build long-lasting, trusted relationships with patients and 73.8% (n=374) thought that patients would be willing to discuss post-discharge medicines-related issues with them. Pharmacists working in independents (≤ 5 pharmacies) were more likely to conduct post-discharge MURs ($p<0.001$), which may reflect the closer relationships established by pharmacists with patients in this type of pharmacy.

Conclusions

The results highlight the willingness of community pharmacists view to provide discharge medicines support. Measures to improve the accessibility of information for community pharmacists, integrate them more into primary care teams and promote the advanced services they offer would enhance the level of care they can provide to patients after a hospital discharge. As this study only looked at community pharmacists' views, further research is needed to assess their ability to provide these services should appropriate discharge communication systems be in place.

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17.2 Publications

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Trends in emergency hospital admissions in England due to adverse drug reactions: 2008–2015

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Abstract

Objectives To determine the scale of adverse drug reaction (ADR)-related emergency hospital admissions in England from 2008 to 2015 using the Hospital Episode Statistics (HES) database.

Methods Part of the HES database contains information about all hospital admissions in England. Annual data are published online and are publically available. These hospital admission data were analysed to determine how many emergency admissions were due to ADRs. International classification of diseases, 10th edition (ICD-10) codes that indicated a drug was the primary cause of the admission were included in the study.

Key findings The total number of emergency hospital admissions increased by 12.1%, from 5 010 670 in 2008/2009 to 5 615 707 in 2014/2015. Over the same period, emergency admissions due to ADRs increased by 53.4%, from 60 055 in 2008/2009 to 92 114 in 2014/2015. These figures indicate an increase in the proportion of emergency hospital admissions due to ADRs over the period of study, from 1.2% in 2008/2009 to 1.6% in 2014/2015.

The total number of bed days utilised decreased by 7.1%, from 51 841 443 in 2008/2009 to 48 183 084 in 2014/2015. Despite this overall decrease, the number of bed days that were used due to ADRs increased by 51.5% from 625 011 (1.2% of all bed days) in 2008/2009 to 947 016 (2.0% of all bed days) in 2014/2015.

The most common ADRs were mental and behavioural disorders due to drugs and the drugs most commonly implicated in ADRs were systemic agents such as anticancer drugs and immunosuppressants.

Conclusions This study demonstrates that emergency hospital admissions due to ADRs are an increasing problem for the National Health Service (NHS) in England and further research is needed to discover which interventions are most likely to reduce them.

Keywords drug-related side effects and adverse reactions; hospital admissions; international classification of diseases; patient admission

Introduction

An adverse drug reaction (ADR) is defined as 'a response to a medicinal product that is noxious and unintended resulting not only from the authorised use of a medicinal product at normal doses but also from medication errors and uses outside the terms of the marketing authorisation, including the misuse and abuse of the medicinal product'.[1] ADRs can be classified in the most basic terms as either pharmacological ADRs which tend to be predictable as they are dose-dependent and known adverse effects based on how the drug works or idiosyncratic ADRs which are unpredictable and not related to how the drug works.[2] It was estimated that in 2002, ADRs cost the National Health Service (NHS) in England £380 million and accounted for 4 in 100 hospital bed days.[3]

Previous studies of ADRs causing hospital admissions have given varying results dependent on the method of data collection. A prospective study of 18 820 patients admitted to two hospitals in North West England over a 6-month period found 6.5% of all hospital admissions were due to an ADR and 72% of these were avoidable.[4] A systematic review of prospective studies concerned with ADR-related hospital admissions found that a median of 5.3% of hospital admissions were for ADRs.[5] A study using

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hospital episode statistics (HES) data reported trends in ADR-related hospital admissions between 1999 and 2009.[6] ADRs were responsible for 0.9% of emergency hospital admissions. Over the study period, ADR-related admissions increased at a faster rate than total hospital admissions and ADR-related mortality increased.[6] Using HES data gives a population-based perspective of the issue as it uses data from all hospital admissions in England.

In 2004, Pirmohamed *et al.*[4] estimated that ADRs cost the NHS £466 million per annum and accounted for the deaths of 0.15% of all patients admitted to hospital. A study by the same group published in 2009 reported that average length of stay for patients who experienced an ADR during their admission was increased by 0.25 days.[7] It is important to update these results to determine whether the situation has changed as this issue was a significant burden for the NHS.

This study will focus on the current situation in England but hospital admissions due to medicines-related problems are a global issue. A prospective case–control study conducted in the Netherlands found that 5.6% of emergency hospital admissions were medicines-related and of these 46.5% were preventable.[8] A review of Australian studies found that 6–7% of emergency admissions were medicines-related and of these 32–69% were definitely or possibly preventable.[9] A US study that used retrospectively collected data from patients' hospital drug charts if they had been admitted due to an ADR found that 62.3% of these admissions were preventable.[10] Another study from the USA found that over a 3-year period, there were an estimated 8000 unnecessary hospital admissions due to preventable ADRs in veterans over 65.[11] There is also evidence from single-centre prospective studies in two European countries: a prospective study of all patients over 65 admitted to a French hospital found that 8.37% of all admissions were due to ADRs[12] and a study from Greece reported that 12.8% of emergency admissions of all patients were due to ADRs.[13] A large study of over 28 000 patients from 81 hospitals in Italy over a 9-year period found the rate of ADR-related hospital admissions was 3.2%.[14] Each of these countries have a different approach to funding and organising health care but the burden of emergency hospital admissions due to ADRs is apparent irrespective of the geographical location.

The aim of this study was to determine the scale of ADR-related emergency hospital admissions in England from 2008 to 2015 by ascertaining the temporal trends, identifying the most common ADRs and which drugs were most commonly implicated in ADR-related hospital admissions.

Methods

HES data contain anonymised information about inpatient admissions, outpatient appointments and emergency department attendances for every NHS Trust in England. The primary reason for collecting these data is financial, but they can also be used for research purposes. These data have been collected since 1989 and are publically available online.[15]

Each HES data record contains information about a patient's admission to an English NHS hospital, including demographic data; clinical information about diagnoses; administrative data such as length of stay; and geographical data about the hospital and the patient's residence. The basic unit of the HES data is the finished consultant episode (FCE), which is the total time a patient spends under the care of an individual consultant. This may differ from length of stay as during a single admission a patient may transfer to the care of a different consultant.[15]

Hospital Episode Statistics data use the 10th International Classification of Diseases (ICD-10) for diagnostic coding.[16] In-patient data are published annually by HES[17] and the data from 2008/2009 to 2014/2015 were used for this study. Data were extracted for any record that contained an ICD-10 code indicating an ADR as the primary diagnosis during an emergency admission. This was based on the criteria used by Wu *et al.*[6] Appendix S1 shows a summary of the ICD-10 codes indicating an ADR. Appendix S2 illustrates codes that show an admission was caused by a particular drug (known as external codes). Hospital admissions due to intentional overdose were excluded from this study.

No ethics approval was required as the study used anonymised, publically available data.

Results

Summary of all hospital emergency admissions due to ADRs

From 2008 to 2015, there were 37 085 640 emergency admissions to hospitals in England; of these, 541 416 (1.5%) had a diagnostic code indicative of an ADR. Table 1 shows the total number of emergency hospital admissions increased by 12.1%, from 5 010 670 in 2008/2009 to 5 615 707 in 2014/2015. Over the same period, emergency admissions due to ADRs increased by 53.4% from 60 055 in 2008/2009 to 92 114 in 2014/2015. These figures reveal an increase in the proportion of emergency hospital admissions due to ADRs over the period of study, from 1.2% in 2008/2009 to 1.6% in 2014/2015. These data demonstrate that the burden of ADRs is increasing, as proportionally higher numbers of patients have been admitted to hospital due to ADRs each year.

Table 2 illustrates that the total number of bed days for all causes decreased by 7.1%, from 51 841 443 in 2008/2009 to 48 183 084 in 2014/2015. Despite this decrease, the number of bed days that were utilised for ADRs increased by 51.5% from 625 011 (1.2% of all bed days) in 2008/2009 to 947 016 (2.0% of all bed days) in 2014/2015. This shows that despite fewer bed days being used over the study period, the proportion that were used because of ADRs increased.

Emergency hospital admissions due to ADRs by ICD-10 diagnosis

Table 3 shows the number of emergency admissions where a primary diagnosis indicated an ADR. The main reason for

Table 1 Total number of emergency hospital admissions and emergency hospital admissions for which there was a primary diagnosis or external cause of an ADR

	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	% change 2008–2015
Total number emergency admissions	5 010 670	5 177 887	5 287 032	5 242 839	5 336 043	5 415 462	5 615 707	12.1
Emergency admissions with drug-induced code	7421	8026	8759	8796	9390	9994	10 512	41.7
Emergency admissions with external cause code	52 634	59 973	65 023	68 481	72 642	78 163	81 602	55.0
Total emergency admissions due to ADRs	60 055	67 999	73 782	77 277	82 032	88 157	92 114	53.4
Percentage emergency admissions due to ADRs	1.2	1.3	1.4	1.5	1.5	1.6	1.6	

Table 2 Total number of bed days and number of bed days utilised for a primary diagnosis or external cause of an ADR

	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	% change 2008–2015
Total number of FCE bed days	51 841 443	51 483 494	51 210 196	48 631 585	48 214 537	47 651 028	48 183 084	−7.1
Number of bed days with drug-induced code	82 142	81 047	92 200	84 478	92 264	90 086	95 150	15.8
Number of bed days with external cause code	542 869	625 025	667 375	676 391	726 541	806 184	851 866	56.9
Total FCE bed days due to ADRs	625 011	706 072	759 575	760 869	818 805	896 270	947 016	51.5
Percentage FCE bed days due to ADRs	1.2	1.4	1.5	1.6	1.7	1.9	2.0	

Table 3 Summary of emergency hospital admissions due to ADRs by ICD-10 chapter

Chapter		2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
D	Drug-induced anaemia	113	102	114	130	151	170	156
E	Drug-induced metabolic disorders	627	753	904	945	1037	1090	1123
F	Mental and behavioural disorders due to drugs	1481	1568	1789	1874	2189	2378	2888
G	Drug-induced neuromuscular disorders	486	505	551	537	594	632	638
H	Drug-induced cataract and hearing loss	3	0	2	1	2	2	0
I	Cardiovascular consequences due to drugs	1401	1488	1668	1609	1752	1709	1693
J	Drug-induced liver disorders	47	50	52	47	53	35	50
K	Toxic liver disease	171	211	198	213	212	270	321
L	Dermatitis due to drugs	1148	1181	1308	1346	1407	1542	1527
M	Drug-induced immune disorders	82	78	91	85	90	79	87
N	Nephropathy due to drugs	54	62	83	83	73	71	56
T	Complications following injection, immunisation or anaesthesia	1808	2028	1999	1926	1830	2016	1973
	Total	7421	8026	8759	8796	9390	9994	10 512

an ADR-related admission was mental and behavioural disorders due to drugs. Between 2013 and 2014, there was a 4.4% increase in the number of prescriptions for medicines affecting the central nervous system.[18] This group includes antidepressants and antipyschotics which are likely to cause these ADRs. The second highest number of admissions were for complications following injection, immunisation or anaesthesia and the third highest for cardiovascular consequences due to drugs.

The greatest increase in hospital admissions over the study period were due to ADRs caused by mental and behavioural problems due to drugs (increased by 95.0%). The next fastest growing ADRs over the study period were toxic liver disease (up by 87.7%) and drug-induced metabolic disorders (up by 79.1%). This increase in the latter category was wholly due to emergency admissions for drug-induced hypoglycaemia without coma, this would be expected as prescription data from 2014 show that there was a

significant increase in prescribing of drugs used in diabetes.[18] Drug-induced cataract and hearing loss was the only category that showed a decrease in emergency admissions for ADRs but the numbers were small and varied significantly from year to year.

Emergency hospital admissions due to ADRs by types of medicines involved

Table 4 shows that for external cause codes, systemic agents caused 23.6% of all ADR admissions. This category includes antineoplastic drugs and immunosuppressants. The next most common drug class to cause ADRs were analgesics, antipyretics and anti-inflammatory drugs (12.6% of ADR admissions), which include opioids, salicylates (e.g. aspirin) and non-steroidal anti-inflammatory drugs (NSAIDs). The third most common drug causes of ADRs were agents affecting the cardiovascular system (11.2% of ADR admissions).

Over the study period, the largest increases in emergency admissions for ADRs were due to agents affecting the gastrointestinal system (increase of 122.3%), hormones and their synthetic substitutes and antagonists (86.2%) and sedatives, hypnotics and antianxiety drugs (73.4%). The only fall was in emergency admissions due to ADRs caused by topical agents affecting the skin and mucous membrane and ophthalmological, otorhinolaryngological and dental drugs. (reduction of 41.3%).

Discussion

The results of this study highlight that the proportion of emergency admissions and bed days utilised due to ADRs have outstripped the increase in emergency admissions and bed days used overall. This study emphasises that emergency hospital admissions due to ADRs remain a significant burden for the NHS in England. The scale of the problem has increased over time and the NHS needs to focus on ways to reduce this burden by preventing ADRs occurring in the first place and striving for safe and consequently more cost-effective treatment for all patients.

To contextualise the data, it is important to consider the number of prescription items issued over this period. Data are available up to 2014 and show that over 1 billion prescription items were issued in that year; this represents an increase of 55.2% compared to 2004. The number of prescription items per head of population increased from 13.7 in 2004 to 19.6 in 2014.[18] This increase in prescriptions appears to relate to the number of ADRs that resulted in a hospital admission as both have increased over the study period. A study by Davies *et al.* showed that ADRs are

Table 4 Summary of emergency hospital admissions due to ADRs by ICD-10 external cause codes

External cause		2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Y40	Systemic antibiotics	5394	5670	6316	6707	7257	7635	8132
Y41	Other systemic anti-infectives and antiparasitics	1151	1476	1510	1648	1795	1817	1820
Y42	Hormones and their synthetic substitutes and antagonists	3570	4237	4855	5107	5901	6432	6648
Y43	Primarily systemic agents	11 746	13 669	15 673	16 434	17 028	18 491	19 253
Y44	Agents primarily affecting blood constituents	2406	2567	2784	2831	3044	3317	3620
Y45	Analgesics, antipyretics and anti-inflammatory drugs	6536	7600	8031	8520	8822	9548	10 242
Y46	Antiepileptics and anti-Parkinsonism drugs	1157	1282	1308	1460	1446	1615	1686
Y47	Sedatives, hypnotics and antianxiety drugs	451	555	528	637	644	796	782
Y48	Anaesthetics and therapeutic gases	256	299	284	310	327	318	400
Y49	Psychotropic drugs, not elsewhere categorised	1821	2177	2259	2484	2541	2697	2829
Y50	Central nervous system stimulants, not elsewhere classified	56	79	84	96	106	93	87
Y51	Drugs primarily affecting the autonomic nervous system	2805	3162	3287	3299	3595	3765	3626
Y52	Agents primarily affecting the cardiovascular system	6555	7257	7528	7852	8518	8973	9142
Y53	Agents primarily affecting the gastrointestinal system	637	773	784	866	973	1227	1416
Y54	Agents primarily affecting the water-balance and mineral and uric acid system	4220	4739	5120	5360	5966	6389	6606
Y55	Agents primarily acting on smooth and skeletal muscle and respiratory system	270	295	316	362	364	368	447
Y56	Topical agent primarily affecting skin and mucous membrane and ophthalmological, otorhinolaryngological and dental drugs	829	863	1053	966	501	495	487
Y57	Other and unspecified drugs and medicaments	2261	2587	2778	2976	3293	3562	3793
Y58	Bacterial vaccines	139	140	130	151	145	160	166
Y59	Other and unspecified vaccines and biological substance	374	546	395	415	376	465	420
	Total	52 634	59 973	65 023	68 481	72 642	78 163	81 602

significantly more likely in patients taking higher numbers of medicines.[7]

The medicines that were most commonly implicated in ADR-related hospital admissions in this study – systemic agents, analgesics, antipyretics and anti-inflammatory agents and agents acting on the cardiovascular system – were similar to those identified in previous studies. Pirmohamed *et al.*[4] analysed deaths that were attributed to ADRs and found that aspirin, NSAIDs, anticoagulants and steroids causing gastrointestinal bleeding, perforated duodenal ulcers and intracranial haemorrhages were most likely to cause fatalities. They also found that ACE inhibitors with or without concomitant diuretics were most likely to cause fatal renal impairment. A systematic review[19] that focussed on the medicines that caused preventable medicines-related admissions to hospital also found the most commonly implicated medicines were antiplatelets, diuretics, NSAIDs and anticoagulants. These medicines are most commonly prescribed to older patients who are at higher risk of adverse events due to age-related changes in pharmacokinetics and pharmacodynamics.[20] Most older patients will have some degree of renal impairment which alters the way the body eliminates certain medicines, for example the excretion of NSAIDs is reduced, digoxin clearance is reduced and ACE inhibitor concentrations are increased. Accompanying these changes in renal function are age-related reductions in total body water, lean body mass, and an increase in the proportion of lean body fat. These changes all affect how the body handles medicines giving rise to an increased risk of ADRs in older patients.[20] Previous studies have not found a high propensity for systemic agents to cause ADRs but from 1999 to 2009, 23 new cancer treatment drugs were introduced in the UK.[21] This vast increase in the use of these potentially toxic agents may account for systemic agents being the main cause of medicines-related hospital admissions in this study.

The increasing trends in emergency admissions due to ADRs found by Wu *et al.*[6] were confirmed by this study. In this study, the fastest growth areas for the primary diagnosis codes were different to those found by Wu *et al.*[6] In their study, the fastest growing ADRs were nephropathy due to drugs, cardiovascular consequences due to drugs and drug-induced lung disorders. In this study, the fastest growing ADRs were mental and behavioural disorders due to drugs, toxic liver disease and metabolic disorders due to drugs. This may be explained by changes in prescribing practice since the Wu study was conducted. For both this study and the Wu study, the fastest growing external code cause of ADRs were drugs related to the gastrointestinal system.

These results reflect previous studies that used HES data,[6] and show a lower proportion of admissions due to ADRs than reported in observational studies.[4] This may be because not all ADR-related admissions in the HES data set are classified as such. Conversely, it has been suggested that observational studies extrapolate from a smaller sample of patients than a national database such as HES and hence the HES figure may be more accurate.[6]

Strengths and limitations of the study

The strengths of this study are that it used routinely collected data which has the advantage of being nationwide, centrally quality assessed, cleaned and collated over many years. The data set is vast and provides information about every hospital admission for the whole of England. The method of data collection is standardised to try and maintain consistency. As the data have been collected since 1989, they can be compared from year to year giving important information about trends in medicine-related admissions over time. One of the limitations of the study is that the data cover only England and the situation may differ in other countries. As the data are collected and entered by a large number of individuals, there is scope for misclassification, variations in data entry and how missing data are dealt with. It is not possible to correct errors or clean the data at the data extraction stage. Also, the data were not intended to be used for research or analysis so caution must be exercised when extracting and interpreting these data.

As this study utilised only publically available HES data, it was not possible to determine whether more than one FCE related to the same in-patient admission. This means that there is the potential for a single hospital admission to have been counted more than once if the patient transferred to the care of a different consultant. The results presented here could potentially be an overestimation of the actual level of emergency hospital admissions due to ADRs. It is also important to note that many ADR-related hospital admissions may not be correctly categorised as such so no single method could claim to be entirely accurate. It was also not possible to link individual patient records to mortality data. If this had been possible, there would have been the potential to calculate the mortality rate due to ADRs which would have been a further useful measure. These data can be extracted by the HES team and could be an area of future research.

Implications for clinicians and policymakers

It would be impossible to completely eliminate all emergency hospital admissions due to medicines as some are unpredictable. However, one study estimated that 72% of ADRs are avoidable[4] and another estimated that 67% of drug-related hospital admissions are preventable.[19] The aim should therefore be to reduce the risk of predictable ADRs. It is interesting to note that the majority of medicines most likely to cause a medicine-related admission to hospital in this study were also identified in a systematic review published in 2002.[3] Perhaps even more scrutiny is required when prescribing these high-risk medicines to ensure they are utilised as safely as possible.

A recent systematic review of studies concerning medicine-related hospitalisations found that old age and polypharmacy were both risk factors for hospital admission.[22] Another review suggested that a combination of discharge planning and home follow-up was an effective method for reducing drug-related problems in older people after hospital discharge.[23] An integrated pharmacy service that crosses the primary–secondary care interface in London

has devised the PREVENT tool[24] that is used to identify patients who are at increased risk of medicines-related admissions and readmissions. Patients identified as high-risk receive enhanced clinical pharmacy input during their hospital stay and post-discharge support if required. A case–control study of 836 patients found that there was a statistically significant reduction in medicines-related readmissions in patients receiving this service ($P < 0.002$).[25] A similar integrated medicines management model in Sweden has also demonstrated a statistically significant reduction in medication-related hospital admissions and associated cost savings.[26]

In the USA, the Department of Health and Human Services has recently reviewed the evidence and highlighted three key areas where medicines are causing particular problems; these are anticoagulants causing bleeding, diabetic agents causing hypoglycaemia and opioids causing oversedation, respiratory depression and as a cause of accidental overdose.[27] By focussing on these high-risk medicines, the aim is to share best practice and reduce medication-related harm.

Enabling patients to be adherent to an altered medicine regime is a key factor after hospital discharge. The NICE guidelines on medicines adherence[28] highlight the importance of involving patients in decision making, supporting adherence, reviewing medication and interprofessional communication. Community pharmacists offer a free medicines-use review service to patients and specifically target people who have been discharged from hospital. This service does not require an appointment and patients are able to discuss their medicines with the pharmacist; this may be an accessible way for patients to get more support and information about their medicines with the aim of reducing medicines-related hospital admissions.

Future research

As the HES data set is so vast, there are many other studies that could be conducted that would add to our knowledge of ADRs and medicines-related hospital admissions. If data records for individual patients were linked it would be possible to investigate whether medicines-related admissions are more common after a recent hospital admission, what the characteristics of patients who experience medicines-related admissions to hospital are, and the effects of medicines-related problems on mortality.

There have been some promising small-scale studies that have integrated pharmacy services across the primary–secondary care interface and using HES data from these areas could help to determine whether these schemes are effective and if they should be expanded.

Conclusions

The burden of ADR-related hospital admissions in England is escalating each year. This study demonstrates that the rate of ADR-related emergency hospital admissions is increasing more quickly than the rate of total emergency hospital admissions and the number of bed days utilised due to ADRs is increasing despite an overall reduction in total bed days used.

Efforts should be focussed on identifying patients at risk of a preventable medicine-related admission to hospital and supporting them to use their medicines safely with the aim of preventing unnecessary hospital admissions. While ways of addressing this have been identified, more widespread adoption or more innovative approaches are needed in order to tackle the burden of ADR-related hospital admissions.

Declarations

Conflict of interest

The author(s) declare(s) that they have no conflict of interest to disclose.

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Authors' contributions

JV designed the study, extracted and analysed the data, and wrote the paper. MW designed the study and reviewed the data analyses and paper.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Appendix S1. ICD-10, four character diagnostic codes used in the study.
Appendix S2. External cause ICD-10 codes used in the study.